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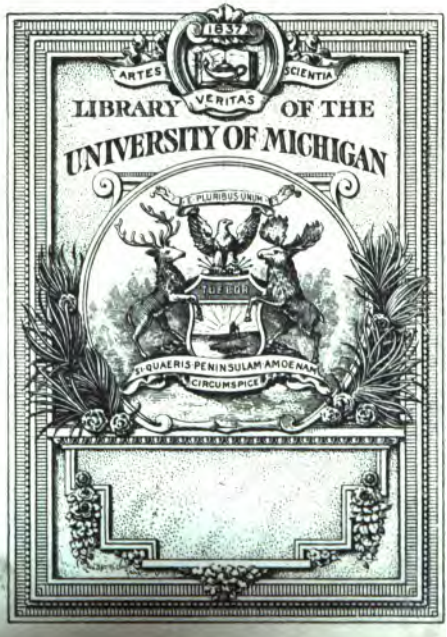
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TRANSACTIONS

OF THE 123074

TWENTY-SIXTH ANNUAL MEETING

OF THE

Ohio State Medical Society,

HELD AT

CINCINNATI, APRIL 4, 5 AND 6, 1871.

CINCINNATI:
BOSWORTH, CHASE & HALL, PUBLISHERS,
1871.

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TWENTY-SIXTH ANNUAL MEETING

OF THE

Ohio State Medical Society,

HELD IN

CINCINNATI, APRIL 4th, 5th, and 6th, 1871.

FIRST DAY.

MORNING SESSION.

THE Society met in Hospital Hall, at 9 o'clock, and was called to order by the President, Dr. T. A. Reamy, of Cincinnati.

Rev. Dr. Briggs, of Trinity Church, opened the meeting with prayer.

Vice Presidents Drs. Herrick, of Cleveland, Brown, of Urbana, McDougall, of Akron, and Brown, of Cincinnati, took seats upon the platform.

The Secretary, Dr. W. C. Hall, was present. Dr. J. P. Thompson, Treasurer, was present and entered upon the discharge of his duties.

The President announced the first business in order was the reading of the minutes of the last session. Dr. W. W. Dawson moved that the reading of the minutes be dispensed with. Motion adopted.

The report of the Executive Committee was called for, whereupon Dr. E. B. Stevens, Chairman of said committee, submitted the following report:

Your Executive Committee beg leave to report that in

use of this hall has been secured for the meetings of this Society; and it is believed that all necessary arrangements have been made for the comfort and convenience of the Society.

Your committee suggest that the meetings be held at 9 o'clock A. M. and 2½ o'clock P. M.

Tuesday evening at 9 o'clock the Society is invited to a banquet in this hall, given by the profession of Cincinnati to the Kentucky and Ohio State Medical Societies.

Wednesday, at 9 o'clock A. M., election of officers; at 11 o'clock A. M., invitation to visit the Cincinnati Hospital; at 3 o'clock P. M., President's annual address; at 9 o'clock P. M., banquet at Odd Fellows' Hall, Ky., by Covington and Newport to Ohio and Kentucky State Societies.

Thursday, 9 o'clock A. M., business, etc.; at 11 o'clock A. M., invitation to Holly Water Works, Covington.

The following railroads have kindly agreed to return members who have paid full fare coming: Atlantic & Great Western, Cincinnati, Hamilton & Dayton, Dayton & Michigan, Dayton & Western, Little Miami, Columbus, Xenia & Cleveland, Cleveland, Columbus & Indianapolis, Marietta. The steamer Bostona carries members at half fare.

All of which is respectfully submitted.

E. B. STEVENS, P. S. CONNOR,
W. W. DAWSON, A. J. MILES,
W. B. DAVIS, G. A. DOHERTY,
Executive Committee.

Dr. E. B. Stevens, on behalf of the Executive Committee, and also on behalf of the profession of Cincinnati, delivered the following welcoming address:

Mr. President and Gentlemen of the Ohio State Medical Society: It is my very pleasant privilege, on behalf of the Executive Committee, as well as the entire profession of Cincinnati, to welcome you to our city on the occasion of your "twenty-sixth annual assemblage."

Representatives of almost every part of our great State, once more you lay aside the armor of your daily conflict with disease—lay aside the anxious cares and fret of your life-battle—lay aside your duties, with their constant mental and physical tension, and come up to this our annual reunion.

We trust the past year has matured your thought, ripened your judgment, enlarged your experience; and, in this interchange of professional thought we shall all go home with greater capacity for usefulness in our work; and in this interchange of professional friendships and courtesies, go home with kindlier regards for our medical fellows—more earnest purposes for continued labors and usefulness in the art and science of medicine.

This Society last convened in this city in 1854. What wonderful changes these seventeen years have wrought! This city has grown in all its features; old landmarks have given way to palatial structures, massive business houses, elegant residences, churches, colleges, a grand hospital edifice; arts, manufactures, letters, merchandise, have been wonderfully developed; and the changes are but typical of those which pertain to us as medical men, and in many respects are inseparably interwoven with our progress. As a society, too, how have we changed! Some *of us have grown—have grown older!*

Some honored men are no longer with us who were listened to in those days with pleasure and profit. Shotwell, Harrison, Mussey (and within a few days, Carroll and Taliaferro) are all gone. Their work is done. Having completed their labor, they are gone to their reward.

Thank God, many who were workers of 1854 are still with us, and good for many a conflict yet! Woodward you honored with the Presidency then. He is still in the ranks and with us to-day—and Russell, and Thompson, and Smith, and Hamilton, and Tate, and Dawson, and Mussey, with scores of others, advancing in years, but blessing society with their lives.

What a wonderful fullness, too, of dramatic events has been crowded into these seventeen years. Since we met here then the world has had its terrible civil upheavals and commotions; our own land has shared in fratricidal strife—in it all the good physician has ever had his toilsome, often thankless, but ever heroic and gracious work to do.

To us the genius of peace, with her bright wings, has returned—let us hope for all time. Our land is again blessed with quiet; we have resumed the glorious arts of civilized and Christian people; brother is again heart to heart with brother. In our social relations as physicians, let us aid in

bringing oblivion over all the sad, dividing past. Intestinal strife is not for us. Let us push forward while we may those things which advance the prosperity and wealth of a nation, and the comfort and happiness of people. As we assemble here to-day, under such pleasant surroundings, we have for all these an omen of good. Our brothers across the river have, in like manner, left their homes and duties and work, and like ourselves are assembled in our beautiful sister city of Covington. I am glad that this will give us, of both States, a season of social intercourse and intermingling, to brighten our scientific labors, such as comes to us but once in a life-time. Let us cultivate the opportunity. Ohio and Kentucky have a glorious record in the past—a glorious history of common and undying interest. Kentucky and Ohio have a glorious host of medical men; let us intermingle and learn that, in the future as in the past, we have a common heritage of profession—hope—country.

In conclusion, gentlemen, allow me to congratulate you on the steady progress we are making in medical knowledge, and the various arts and practices which prolong human life. We have had our social and civil commotions, and yet these have but exhibited the vigor of the people. The country is being more and more developed; cities grow, princely estates are placed under culture, elegance and refinement mark the character of the people. In the same steady ratio of progress do we grow, in all that pertains to medicine; the laws of health, plans for protecting communities and cities from plagues and epidemics, therapeutics, surgery, midwifery—in all directions we grow. The transactions and reports of this society in part mark, from year to year, the grand aggregate; and I trust the work of this year will add one more way mark to tell of the earnestness, fidelity and ambition of the profession of medicine in Ohio.

Once more the profession of Cincinnati extends the sincere hand of welcome to our brothers of Ohio.

The President announced that, owing to the illness of Dr. W. B. Davis, a vacancy was made in the Committee on Admissions, and appointed Dr. M. Cassatt in his stead.

Dr. J. B. Thompson, Treasurer of the Society, by leave, made his report, which, on motion, was referred to the Finance Committee.

The Committee on Finance respectfully report that they

have examined the accounts and vouchers of Dr. J. B. Thompson, Treasurer of this Society, and find them correct, as follows:

Balance in Treasury at last report, ...	$306 99
Receipts from initiations, assessment and sale of transactions, ...	690 47
Total, ...	$997 46
Total amount of expenses as per vouchers, .	869 18
Balance in Treasury, ...	$128 28

We further recommend that the Treasurer and Secretary receives the same salary as last year; that the transactions be bound as the last, in cloth; and to meet this increased expense, we advise that the assessment this year be two dollars.

W. H. MATCHETT, W. H. MUSSEY. } *Finance Committee.*

April 4, 1871.

On motion of Dr. W. W. Dawson, a committee consisting of Drs. M. B. Wright, W. P. Kincaid, C. Woodward, Alex. Dunlap, and E. B. Stevens, ex-Presidents of this Society, were appointed to wait upon the Kentucky State Medical Society, and invite the members to meet with us and participate in our proceedings.

The President proceeded to call the standing and special committees. The Committees on Publication and Finance asked time to report. Granted.

Dr. E. B. Stevens, special committee on uterine catarrh; Dr. J. A. Little, special committee on antagonistic powers of opium and belladonna; Dr. D. D. Bramble, special committee on chloral hydrate; Dr. J. R. Black, special committee on sanitary science; Dr. W. W. Seely, special committee on diseases of the eye; Dr. J. R. Black, chairman of the committee on diseases and their causes; Dr. S. S. Scoville, special committee on physical and vital forces; Dr. R. Wirth, special committee on diseases of the larynx; Dr. W. H. Mussey, special committee on improvements in surgery; reported papers ready at the convenience of the Society.

On motion, Dr. E. B. Stevens read his report on *Uterine catarrh,* which was listened to with much interest; and, on motion of Dr. Kincaid, the paper was laid on the table for discussion.

Drs. Lyon, Bigelow, and Harding, delegates from the Indiana State Medical Society, were introduced to the Society, and welcomed by Dr. Reamy, the President, and invited to take seats with the members, and participate in the proceedings.

Dr. S. S. Scoville, special committee on *Physical* and *Vital forces,* proceeded to read his report. On motion the paper was referred to the Publication Committee with instructions to print. The paper was discussed by Drs. Herrick, Hyde, Harding and Scoville.

Dr. J. W. Hadlock, of Cincinnati, was at this juncture elected assistant secretary.

On motion of Dr. E. B. Stevens, the Secretary read an invitation requesting the Society to visit the Cincinnati Hospital. Accepted.

During the session this morning, the following new members were elected:

NEW MEMBERS—FIRST DAY.

P. M. Bigney, Cincinnati.	D. J. Snyder, ———
W. Stark, "	John R. Woods, Warren.
C. A. Miller, "	H. Luddington, Cincinnati.
Wm. Carson, "	Byron Stanton, Cincinnati.
J. W. Hadlock, "	F. C. Larimore, Mt. Vernon.
Warren Woodward, "	C. D. Palmer, Cincinnati.
L. C. Herrick, Cleveland.	E. R. Lang, Portsmouth.
E. L. Shackelton, St. Marys.	A. Titus, Wheelersburg.
H. Senseman, Clark Co., Ohio.	J. T. Whittaker, Cincinnati.
H. S. Jewett, Dayton.	R. McD. Gibson, Seneca Co.
W. W. Seely, Cincinnati.	E. J. McCullom, Seneca Co.
L. A. Cottle, Maineville.	W. H. Campbell, Concord, Ky.
G. B. Orr, Cincinnati.	W. A. Carmichael, Loveland.

Delegates from the following local societies were present: Seneca County Medical Society, R. McD. Gibson, E. J.

McCullom; Scioto County Medical Society, A. B. Jones, A. Titus, E. R. Lang, C. M. Finch; Meigs County Medical Society, A. L. Knight, J. R. Meeks; Montgomery County Medical Society, H. S. Jewett; Northwestern Ohio Medical Association, E. L. Shackleton, Fulton Co., S. P. Bishop, Wm. Hyde; Mt. Vernon Medical Society, F. C. Larimore, J. W. Russell, H. W. Smith.

The Society took a recess until 2 o'clock P. M., on motion of Dr. Hall.

AFTERNOON SESSION.

President (Dr. Reamy) in the chair. Dr. J. A. Little, of Delaware, special committee on the *Antagonistic powers* of *opium* and *belladonna*, read his report, which was referred to Committee on Publication, with instructions to print.

Dr. E. B. Stevens, chairman Executive Committee, introduced Drs. Todd, Yandell, and Kearns, delegates from the Kentucky State Medical Society, who each came forward, and in kind terms extended the greetings of the Kentucky State Medical Society, now in session in Covington, and invited our members to meet with them.

Dr. W. H. Mussey, of Cincinnati, special committee on *Improvements in Surgery*, read his report, and exhibited casts and photographs of various kinds of tumors.

On motion, the paper of Dr. Mussey was referred to Committee on Publication, with instructions to print.

Dr. J. R. Black, special committee on *Sanitary Science*, read a lengthy report upon that subject, which was discussed by Drs. McIlvaine, Black, and Reamy, and was referred to Publication Committee, with instructions to print.

The following is a synopsis of DR. R. R. MCILVAINE'S remarks in review of the paper above referred to:

MR. PRESIDENT: I wish to inquire of our colleague if I understood him, in his able and elaborate paper, that there was a deterioration of the American people, and the feminine portion in particular? [The Doctor was proceeding to discuss the question just raised by Dr. Black in his paper, when

he was called on by many voices from various parts of the house, to take the platform, that all might hear more distinctly what he had to say. In taking the stand, he remarked that as time was precious, his remarks would be characterized with great brevity.] In the first place, the gratuitous assertion that the beauty of the American women is short-lived, and that before they have scarcely attained their majority, like the early cloud or morning dew, passes away, is a proposition incapable of demonstration.

I have had, Mr. President, the opportunity of seeing women in various places and under varied circumstances. I have not seen them at the receptions of that scamp Napoleon, nor those of Victoria, though I have met with persons who attended both. I am too much of a democrat to seek admission to the residences of despots. Now, let us begin by illustration; and we will give the late Mrs. Madison as a sample of the olden-time women. At her advanced age had she many peers? and we leave the history of her time to answer whether she had any superiors. We give her, then, as the type of a class; and we are happy to say that the class of which she was the representative, is not extinct, but will assert, without fear of successful contradiction, that there are among the women of Ohio to-day representatives of every decade from that of womanhood to the octogenarian, that will compare in point of proportion, which is the foundation of beauty, with the same number of women in this or any other country.

Now, Mr. President, as to the proofs that we are not deteriorating. In 1850, if I remember rightly, in every 2,178 of the entire population of the United States, there was one over 90 years of age, and in every 25,000, in round numbers, there was one over 100 years of age. Mr. President, it is not I who speak, it is history. It is the bible of politics and progress, the census of the United States for 1850, that I credit with these facts.

But further, Mr. President, the State of New York in 1860, had a white population of 3,831,500; of this number there were 1,646 persons over 90 years of age, namely: 704 men, and 942 women; thus in every 2,327 there was one over 90, and in every 41,647 there was one over 100 years; in both cases women being in the majority.

Mr. President, we will next call your attention to the

State of Ohio. In 1860, with a white population of 2,302,808, there were over 90 years of age 760; of this number were 366 men, and 394 women, and, therefore, there was in every 3,030 one over 90 years of age, and in every 33,864 one over 100 years of age. In this case, as in that of New York, aged women are in the majority.

Again, Mr. President, we will direct your attention to old Virginia. In 1860, with a white population of 1,047,299, there were 245 men and 296 women over 90 years of age (total, 541), which gives one over 90 in every 1,935, and in every 15,178 there was one over 100 in her entire white population.

And further, Mr. President, we shall cite a more northern latitude. In 1860 the white population of the State of Vermont was 314,369. In this small population there is evidence of vitality; there were over 90 years of age 146 men, and 180 women, and here, as in all the States named, women have the majority. In every 961 there was one over 90, and over 100, 13, being one in every 24,182 of her entire population.

Here, Mr. President, we have given a tabulated view of each section, east, west, north, and south, and we think it proves conclusively that we are not deteriorating.

Now, Mr. President, the entire white population in 1860, of the United States, was 26,690,206. Of this number, one in every 2,775 and a fraction, was over 90 years of age. Of this population there were 902 over 100 years of age, making one in every 29,578 and a fraction. These figures, Mr. President, speak for themselves, and we pass to inquire whether man in the aggregate has been deteriorating. It was intimated that in the hotter climates, as in India, that the population have to be recruited from more temperate regions. That the capacity of the white man—who is the emigrating man—for self-sustaining and reproducing in all regions, is a question I think history has settled. Emigration is not peculiar to our day, nor are discoveries. Pharo Necho, 616 years before our era, sent out an expedition on a voyage of discovery, which was successful in its mission. Bartholomew Diaz, in 1485 of the Christian era, discovered the Cape of Good Hope, which Pharo Necho's men had discovered 2,101 years before. Barnatz, a Holland navigator, in 1596, discovered the Island of Spitzbergen, the most northerly land on the globe, so far as we know, in the Arctic regions,

n latitude 80° 48′. But this is not all; the descendants of these same Hollanders founded a colony at the Cape of Good Hope in 1650, which, so far as we know, remains to the present time. This is in latitude 34° 30′ south.

Now, Mr. President, another subject has been touched upon, and authorities have been cited. You are aware, sir, that authority is not always truth, but truth is always authority. The agitation of this subject is not of yesterday, it carries us to the past. I mean, sir, this subject, which has been so severely censured in his paper by our colleague, namely, the marriage of relatives. This is a subject that the Popes claimed at an early day to regulate by their authority. Thus Gregory the First, A. D. 598, pronounced marriages unlawful as far as the seventh degree of colateral consanguinity, computed from the common stock. Pope Innocent the Third, in 1198, in the plenitude of his power, claimed that he had a right to dispense with the law; hence, the Lateran council, in 1215, passed a remedy for those disabilities, and permitted marriages after the fourth degree, or what we call third cousins. It may be assumed that these things were done by the Popes to be as unlike Judaism as possible. From 325 of the Christian era, on the 19th of June, when the first Nicene council met, from that time it was the well-defined policy of those unsanctified wretches calling themselves Christians, to persecute the Jews, century by century, till 1790, when a new era dawned. The Jew, under the benign influence of the French revolution, found himself recognized as a man.

Now, Mr. President, we are brought face to face with facts against fancy, and demonstrations in opposition to assertion. That science should have its romance as well as literature, is not to be thought strange. For years we have been told, by those who profess to guide us, that the source of all our disasters, social and physical, was the intermarriage of relations. We have stated that the Jew found himself a man since 1790. To-day they are socially, morally, intellectually, politically, and pecuniarily, stronger than they have been at any period since the year 70, when, on the 10th of July, the Roman General destroyed their temple and blotted them out as a nation. Now let us inquire into their origin, and this demands of us to go east to Mesopotamia. There, 1998 years before our era, the father of the Jewish nation, Abraham,

was born. In due time he married his half-sister. The issue of this marriage was a son, but on this son there was no outer and visible sign of imperfect organization. In due time this son, Isaac, married his first cousin, Rebecca, and from this union sprang two sons, Jacob and Esau, the former in due time marrying his two cousins. He, Jacob, the "New England Yankee of the Bible," became a trader, and his ability to acquire property is historical, and the standing type of his race to this day.

But we will not fatigue you with their history—all can read it who choose. We pass now to the unduplicated man of history, Moses, who was born 1571 years before our era. Was his mother a Greek, and his father from the banks of the Tigris? No! His father, Amram, married his own aunt, his father's sister. Was Moses deaf? or was he idiotic? or was his brother Aaron a sufferer from mental incompetency? or have the descendants of the Jews to our day been distinguished by those diseases which are said to be the results of intermarriages? This we emphatically deny, and with all these facts before us, with nearly 2,000 years of oppression from a dominant religion, by their adherence to the great fundamental principle of the Mosaic faith, they have triumphed over all disabilities; hence we may conclude, in the language of one of their own prophets, "That Judah yet ruleth with God."

The doctor made the above remarks impromptu, and had to draw on his memory for the dates given, and he stated that if any mistakes occurred in data he stood ready to be corrected.

Dr. Dawson, on the part of the Executive Committee, presented the following order of business for to-morrow:

9 A. M.—Election of officers.
9½ " Dr. Bramble's report on Hydrate Chloral.
11 " Visit the hospital.
2½ P. M.—Paper of Dr. Seely on Diseases of the Eye.
3 " Valedictory.
4 " Dr. Wirth's paper.

The Committee on Admissions, during the afternoon session, presented the following names, and recommended their admission. All were elected: J. M. Tucker, D. S. Young,

A. B. Isham, A. C. Kemper, T. H. Kearney, W. P. Thornton, O. E. Davis, M. Robb, N. H. Sidwell, J. W. Mendenhall, J. J. Morey.

On motion, Society adjourned until to-morrow morning, 9 o'clock.

SECOND DAY.

MORNING SESSION.

The Society met at 9 o'clock, and was called to order by the President, Dr. Reamy. Prayer was offered by the Rev. Dr. Boyce, of the Plum-street United Presbyterian Church.

The minutes of yesterday's proceedings were read by the Secretary and approved.

Dr. A. W. Pinkerton, of Indiana, was introduced to the Society by the President, and invited to take a seat with the members and participate in the proceedings.

Dr. Cole, delegate from West Virginia, was introduced; came forward and addressed the Society in a few well chosen remarks.

The Society went into the annual election of officers, Drs. Jones, Wirth, and Sinnett being appointed tellers. The result was as follows:

Dr. W. W. DAWSON, Cincinnati.....*President.*

Dr. L. KAY, Springfield,
Dr. C. P. LANDON, Westerville,
Dr. E. SINNETT, Granville,
Dr. J. W. RUSSELL, jr., Mt. Vernon, } *Vice-Presidents.*

Dr. W. C. HALL, Fayetteville, *Secretary.*

Dr. J. W. HADLOCK, Cincinnati, *Assistant Secretary.*

Dr. J. B. THOMPSON, Columbus, *Treasurer and Librarian.*

Committee on Admissions—Drs. Little, Pearce, Grey, Baker, and Black.

On motion of W. H. Mussey, it was agreed that when this Society take a recess, it be to 2 o'clock P. M.

The place of our next meeting was now considered. Dr. Jones invited the Society to Portsmouth. Yellow Springs, Springfield, Dayton, and Newark were also named; a vote being reached, Dayton was selected.

At this morning's session the following new members were duly elected:

N. Hall, Cincinnati.
E. A. Day, ———
A. P. Courtright, Groveport.
A. T. C. Worthington, Middletown.
L. W. Bishop, Mainville.
J. H. Green, Troy, Ohio.
W. R. Thompson, M'tgomery Co.
Jacob Kirby, Hillsboro.
A. Rosenfeld, Cincinnati, O.
J. Ludlow, Cincinnati, O.
William Hyde, Fulton Co.
W. G. Bryant, Springfield.
J. M. Hall, Fayetteville.
George Holdt, Cincinnati.
W. M. Logan, "

Also the following Delegates:

Drs. William R. Thompson, Medical Society of Montgomery county; J. W. Hoff and J. R. Meeks, Meigs county Medical Society; Lewis Schwab, Scioto county Medical Society; J. H. Greene, Miami county Medical Society.

The President announced that arrangements had been made for the Society to visit the Cincinnati Hospital at this hour, and the Society took a recess until 2 o'clock. Dr. W. H. Mussey invited the members of the Society to visit the Pathological Museum of his late father, at the Miami College, on Twelfth street, after the adjournment of the meeting at the hospital.

The members of the Society, and also the Kentucky State Medical Society, visited the Cincinnati Hospital, and were shown through the extensive wards by the officers of the institution. Several interesting surgical cases were shown to the visitors by Drs. Dawson and Kearns.

AFTERNOON SESSION.

Vice-President Dr. H. J. Herrick in the chair.

Dr. D. D. Bramble, of Cincinnati, read his report on *Chloral Hydrate*, which was listened to with much attention, and ordered published with the transactions.

The Chair appointed Drs. H. J. Herrick and R. Gundry a committee to wait on Dr. W. W. Dawson, the President elect, and conduct him to the chair. Dr. Dawson, on assuming his new position, thanked the Society for the honor in fitting terms.

The retiring President, Dr. Reamy, delivered his valedictory address, which was quite able, and the audience showed their appreciation of the paper by frequent applause.

Dr. T. A. Reamy was tendered the thanks of the Society, and on motion of Dr. Stevens, the address was ordered to be printed with the transactions.

Dr. Seely read his report on *Disease of the Eye*, which was ordered published with the transactions.

Dr. Wirth, special committee on *Diseases of Larynx*, read his report, which was, by vote of the Society, ordered to be printed.

Dr. R. R. McIlvaine, delegate from this Society to the State Medical Society of New York, made a report of his attendance upon said Society. Report received, adopted, and ordered to be printed with the transactions.

Dr. Hall presented and read a report of Dr. A. N. Reed, of Norwalk, upon the same subject. Ordered to be printed.

Dr. R. R. McIlvaine, on account of his removal to New York City, offered his resignation as a member of the Ohio State Medical Society.

Dr. Thompson moved to make Dr. McIlvaine an honorary member of this Society. Carried unanimously.

Dr. McIlvaine thanked the Society for the honor conferred.

The chair announced that papers would be read on to-morrow by Drs. Bartholow and Whittaker.

On motion, Society adjourned until to-morrow morning at 9 o'clock.

THIRD DAY.

MORNING SESSION.

The Society was called to order promptly at 9 o'clock this morning; President Dr. Dawson in the chair.

Prayer was offered by the Rev. Mr. Halley, of the Congregational Church.

The minutes of yesterday's proceedings were read and adopted.

The attendance this day was very good.

Dr. Kincaid moved to reconsider the vote fixing on Dayton as the place to hold the next annual meeting, and gave as his reason for said motion that none of the profession of that city had invited the Society there.

The motion was adopted, and Portsmouth was substituted in its stead.

Dr. Roberts Bartholow, of Cincinnati, read a volunteer paper on the use of the *Ophthalmoscope* and the *Sphygmograph* in the study of therapeutic agents. The paper was referred to the Committee on Publication, with instructions to publish with transactions.

Dr. James T. Whittaker read a volunteer paper on *Experiments in Reproduction,* which was, on motion, referred to Publishing Committee, with instructions to print.

On motion of Dr. Leonard, Dr. E. B. Stevens' report on *Uterine Catarrh* was taken from the table and discussed by Drs. Alex. Dunlap and M. B. Wright. A vote being taken,

the paper was referred to Publishing Committee, with instructions to print.

The Society, on motion, took a recess until 2 o'clock, to enable the members to visit Covington and witness an exhibition of the Holly Water Works.

AFTERNOON SESSION.

The Society met at 2 o'clock, President, Dr. Dawson, in the chair.

The Committee on Publication made the following report, which was, on motion, adopted:

525 copies of the Transactions were published at a cost of	$483 00
500 copies of the Constitution, ...	25 00
	$508 00

W. C. Hall, J. B. Thompson, H. Drury, Publishing Committee.

The Secretary inquired the wish of the Society in regard to the *Report on the Prevailing Diseases of the State.*

Dr. J. R. Black (chairman of said special committee appointed last year)—A motion was made to read the paper by title, in consequence of the lateness of the session. Dr. Gundry inquired if the Society was not establishing a bad precedent in thus crowding out regular reports and giving place to volunteer contributions.

Dr. Hall explained that the chairman, Dr. Black, was compelled to return home on Thursday morning, and had left his report in his hands, and he was ready to read it did the Society so request, and fully agreed with Dr. Gundry in all he said. The paper was read by title and referred to Committee on Publication, with instructions to print.

Dr. Hall stated that the report of Dr. Black embraced only 28 of the 82 counties in the State, and hence was not complete. He, therefore, moved that a committee upon the

subject be continued of which Dr. J. R. Black should be chairman; motion carried.

The President, Dr. Dawson, announced a volunteer paper on the *Infecting Substance in Contagious Diseases and in Epidemics*, by Dr. C. G. Comegys. On motion, the paper of Dr. Comegys (the author being called out of the city) was read by title and referred to Publishing Committee, with instructions to print.

Dr. W. J. Conklin being compelled to be absent, Dr. R. Gundry read a paper prepared by Dr. Conklin on *The Relations of Epilepsey to Insanity and Jurisprudence.*

The Committee on Finance presented the following, and recommended its payment, which was adopted:

Ohio State Medical Society: To W. C. Hall, Dr.

To 1,000	blank credentials,	$10 00
" 600	post-paid envelopes,	20 75
"	circulars,	6 00
" 500	seals,	1 25
	Total,	$38 00

W. H. MATCHETT,
Chairman Finance Committee.

Dr. James Hibberd, of Indiana, and Dr. N. Dalton, of Mineral Point, Wisconsin, were elected honorary members of this Society, on motion of Dr. E. B. Stevens.

Dr. D. S. Young, of Cincinnati, read a volunteer paper on *Mechanical treatment of Stricture*, which was, on motion, referred to the Publication Committee, with instructions to print.

Dr. E. B. Stevens stated that he had collected additional historical facts relative to this Society, which his report last year did not contain, and asked leave to submit them to Publication Committee, with instruction to print. Granted.

During the session to-day the following new members were duly elected:

NEW MEMBERS—SECOND DAY

J. L. Wilson, Greenfield.
A. M. Whitehead, Springfield.
N. P. Dandridge, Cincinnati.
J. B. Owsley, Jacksonburg.
W. W. Shepherd, Hillsboro.
R. D. Huggins, West Alexandria
William Sayler, Gratis.

The chairman announced the following

STANDING COMMITTEES.

Executive—A. B. Jones, L. Schwab, S. Pixley, C. M. Finch, A. Titus.

Publication—W. C. Hall, J. W. Hadlock, J. B. Thompson, A. J. Miles, A. Wilson.

Finance—T. B. Williams, Warren Woodward, M. W. Junkens, J. B. Owsley, R. F. Sweney.

Medical Societies—J. D. Cotton, D. Noble, J. M. Brown, C. A. Miller, A. C. Kemper.

Medical Ethics—B. F. Hart, Byron Stanton, J. T. Morey, A. Follett, G. B. Orr.

Obituaries—B. B. Leonard, A. M. Brown, M. Cassat. J. D. Edwards, N. P. Dandridge.

SPECIAL COMMITTEES.

Uterine Therapeutics—H. J. Herrick, Cleveland.
Ovariotomy—A. Dunlap, Springfield.
Eye and Ear Surgery—W. W. Seely, Cincinnati.
Vaccination—W. B. Davis, Cincinnati.
Nervous Transmission—S. S. Scoville.
Generation—J. T. Whittaker, Cincinnati.
Puerperal Convulsions—J. Pomerine, Cincinnati.
Pathology of the Blood—W. P. Thornton, Cincinnati.
Therapeutics of Mineral Springs—G. E. Walton, Cincinnati.
Therapeutics of Electricity—R. Bartholow, Cincinnati.
New Remedies—E. R. Lang, Portsmouth.
Gynœcology—C. D. Palmer, Cincinnati.
Chronic Diseases of the Lungs—Wm. Carson, Cincinnati.
Hernia Cerebri—P. S. Connor, Cincinnati.

Obstetric Records—J. Helmick, Cleveland.
Castration—W. C. Hall, Fayetteville.
Electrolysis—W. H. Mussey, Cincinnati.
Cholera Infantum—A. J. Miles, Cincinnati.
Amputations—T. H. Kearney, Cincinnati.
Belladonna—J. A. Little, Delaware, Ohio.
Diseases of the Larynx—R. Wirth, Cincinnati.
Uterine Diseases—E. B. Stevens, Cincinnati.
Diseases of the Skin—C. O. Wright, Cincinnati.
Surgical Diseases of Women—T. A. Reamy, Cincinnati.
Medical Chemistry—J. B. Hough, Ridgeville.
Puerperal Insanity—R. Gundry, Dayton.
Prevailing Diseases throughout the State—J. R. Black, Newark.
Inflammations of the Chest—J. A. Murphy, Cincinnati.
Semiological Value of Yellow Elastic Tissue in Sputum—A. T. Keyt, Cincinnati.
Relation of the Mental to Man's Physical Forces—A. B. Jones, Portsmouth.
Asylums for Epileptics—W. J. Conklin, Byron Station; W. L. Peck, R. Gundry.
Psychology—J. W. Hadlock, Cincinnati.
Delegates to American Medical Association from the Ohio State Medical Society—Drs. T. A. Reamy, Cincinnati; W. H. Wilson, Greenfield; W. C. Hall, Fayetteville; John A. Little, Delaware; B. B. Leonard, West Liberty; J. S. R. Hazzard, Springfield; John Corson, Middletown; M. B. Wright, Cincinnati; R. Gundry, Dayton; E. B. Stevens, Cincinnati; C. P. Landon, Westerville; H. J. Herrick, Cleveland; T. W. Jones, South Bloomfield; Wayne Griswold, Circleville; Charles Woodward, Cincinnati; W. M. Matchett, Greenville; S. M. Smith, Columbus; C. A. Miller, Cincinnati; R. M. Denig, Columbus; E. R. Lang, Portsmouth; J. W. Hadlock, Cincinnati; Jacob Kirby, Hillsboro; B. F. Hart, Marietta; W. W. Shepherd, Hillsboro; J. W. Hamilton, Columbus; J. D. Cotton, Marietta; R. Wirth, Columbus; A. B. Jones, Portsmouth; J. C. Reeve, Dayton; G. A. Doherty, Cincinnati; D. Noble, Hillsboro; William Carson, Cincinnati; A. Robb, Blanchester; N. Foster, Cincinnati; L. T. Pease, Williamsburg; W. H. Campbell, Concord, Ky; I. L. Drake, Lebanon; Alfred Follett, Granville; E. Jennings, Dayton; J. B.

Kemp, Vandalia; J. L. Vattier, Cincinnati; G. B. Orr, Cincinnati.

Delegates to Indiana State Medical Society—Drs. T. A. Reamy, A. C. McLaughlin, R. C. S. Reed, A. E. Highway, J. T. Whittaker.

Delegates to Kentucky State Medical Society—Drs. A. E. Jenner, J. C. Kennedy, J. A. Murphy, N. Baker, C. G. Comegys.

Delegates to New York State Medical Society—Drs. A. Dunlap, W. P. Kincaid, A. Robb, C. P. Landon, W. H. Mussey.

Delegates to Illinois State Medical Society—Drs. H. J. Herrick, J. A. Little, D. D. Bramble, H. C. Pierce, W. C. Jacobs.

Delegates to Kansas State Medical Society—Drs. W. C. Hall, S. S. Scoville, S. B. Bishop, B. F. Miller, O. E. Davis.

Delegates to West Virginia State Medical Society—Drs. J. W. Hamilton, J. Strong, J. Corson, G. C. Blackman, H. J. Donahue.

[The members throughout the State who were in attendance will long remember their professional brethren in the sister cities of Cincinnati and Covington. Their efforts to entertain the members were untiring—good looks, good feeling, good cheer, good banquets—good every thing, characterized the meeting throughout.

W. C. HALL, *Secretary.*]

The Society adjourned to meet in Portsmouth on the 2d Tuesday of June, 1872, on motion of Dr. W. C. Hall.

W. W. DAWSON, *President.*

W. C. HALL, }
J. W. HADLOCK, } *Secretaries.*

ANNUAL ADDRESS

OF THE

RETIRING PRESIDENT,

THAD. A. REAMY, M. D., CINCINNATI, OHIO.

ANNUAL ADDRESS

OF THE

RETIRING PRESIDENT,

THAD. A. REAMY, M. D., CINCINNATI, OHIO.

GENTLEMEN OF THE STATE MEDICAL SOCIETY.—One year ago at Cleveland, with great unanimity, you called me to the Presidency of this most honorable body. No words can express the gratitude of my heart for this high proof of your confidence and esteem. It was the crowning act in that course of generosity and friendship, which you have so uniformly manifested toward me since I became a member nearly twenty years ago.

Custom, as old as this organization, imposes as the last duty of the retiring officer an address. In discharge of this duty I shall be brief, and though your attention may be called to several topics, nothing like a thorough discussion of any will be attempted. Last year gentlemen of ability were assigned to all the special committees; most of them either have, or are ready to report. Several volunteer papers from gentlemen of equal ability are awaiting the ears of the Society. So I may congratulate you that the volume of transactions this year will be of unusual interest.

We are here to-day, gentlemen, after another year of toil and conflict, to compare notes and hear reports from various

quarters. Here to confess our defeats—to rejoice over our victories. Young men are here to listen to the counsels, and be imbued with the wisdom of old men. Old men are here to encourage, and in turn to be stimulated by the enthusiasm of those who are younger. All are here to meet, and greet, and bid each the other God's speed in the noble mission of mitigating human suffering, and so far as possible to turn aside the shafts of death. But without further preliminaries, I call your attention to one of the topics to which I shall ask your special attention. A hackneyed subject, I grant. Nevertheless, one, of whose interests you are the special guardians, viz: MEDICAL EDUCATION, more particularly in its preliminary stages. State and national associations, have spent much time within the past few years in discussing the various phases to this general question.

Attention has been called to what should constitute a college course, the proper division of studies, time to be employed, manner of conducting final examinations, fees to be charged, etc., etc. At a recent session of the American Medical Association much time was spent in an excited discussion of a proposition to refuse recognition of any school charging less fees than prescribed by that body. Conventions of medical teachers have been held in the interests of these various reforms.

So far, but little advance has been made in any direction for the better. Among the more important and heretofore unremediable evils, have been *deficient* preliminary education, and imperfect course of office instruction. The imputation that medical men in this country, as a class, are very deficient in mental culture, is unfounded; many are among the most thoroughly educated. But the time has come when there should be no exceptions to this statement among those who are graduates of regular colleges. And yet none can deny that in all quarters young men are entering the professional ranks—assuming the sacred responsi-

bilities enjoined, without adequate preparation. All regular Medical Colleges in the country require of those admitted to an examination for the degree of "Doctor in Medicine," a certificate of good moral character; of having acquired a good English education; of three years medical and surgical study in the office of a respectable practioner, including attendance upon two full courses of lectures, the last of which shall be in the school whose honors are sought.

Now, in almost all cases the certificates of character, of English Education and office study under instruction, are furnished by the "*respectable* Practitioner"—the office Preceptor. But do these certificates tell the truth always? Have their holders all a good education, and have they enjoyed three years faithful office instruction? In many cases finished scholarship has been attained, and faithful office instruction imparted. But any gentleman who has been connected with medical teaching, knows that many of the applicants can not write three sentences without violating rules of orthography and syntax. Until our reforms in teaching have cleared away such elementary evils, I think the important question as to whether, in all cases, a medical student shall be required to have a classical education may, with great propriety, be waived.

It is a shame, that in these days when our public schools offer *all*, "*without money and without price*," an ample and thorough education, demanding in its acquirement simple application and industry, when, from the beneficent hands of public instruction, the children of this country are receiving thorough culture, that young men will present themselves at the portals of a learned profession, without even a correct knowledge of their native tongue; and yet such is the state of affairs. We complain often that the claims of legitimate medicine are not recognized, we cry out in holy horror at Eclectic Colleges, so called, who send forth full fledged their doctors in medicine, after six week's incuba-

tion, to prey upon poor mortality. We complain that people will have confidence in the shams and deceptions of homœopathy—a system which only demands a recognition of symptoms—a system whose banners can be borne as victoriously after two months drilling as though ten years were spent in hard study and training. What right have we to complain? Can we do better building on such foundations? Until we have ceased to open the doors of legitimate medicine to those utterly unqualified to enter, *let our lips be sealed as to quackery in other quarters.* What is the remedy? Let each practitioner test the acquirements of each applicant for office pupilage, who can not present the credentials of a reputable institution of learning, or other indisputable evidence. If, upon examination, he is found wanting, and the man seems to have good mind, send him to the public schools. If he refuses to go, no matter what his plea, refuse him admittance as your pupil. This course is plain, easy, practical, and you owe its adoption to the applicant, to the profession, to humanity. It has been proposed to establish county and state boards of censors, to examine all young men contemplating the study of medicine.

I think it quite probable that some such rule will be adopted at the coming session of the American Medical Association; but from the experience of the past, I am led to have little confidence in the plan. The colleges have heretofore refused to be governed by the mandates of the American Medical Association. It ought to be the acknowledged exponent of the medical law of the land. Unfortunately, however, such has been its habit of meddling with questions over which it should have no control, and manner of dealing with those legitimately within its power, that the profession does not reverence its authority. Moreover, these boards of censors would be attended with more or less of the evils and inconveniences always embarrassing the operations of such bodies, which I need not here name. In my humble judg-

ment, the simpler, and far more effectual remedy is with each individual practitioner. Still I should not oppose the establishment of the boards; whether established or not, the individual duty incumbent upon each practitioner is not removed.

For several years, the plan of an examination, when application for matriculation is made, by a board of the college, has been urged as the best. To this there are several objections. I name but one. Generally, when the student presents himself for matriculation, he has already spent two years in office study, and made all his arrangements for the college course, often has traveled from home in order to present himself. If found wanting, the order of his plans must be changed, and his two years of study equivalent to lost time.

And now as to office pupilage. How many who have the name, are really nothing more than office boys receiving messages, and keeping current accounts, collecting bills, etc. They are permitted to be present during examination of the simpler cases that are prescribed for. But how often are they thoroughly drilled in their studies, trained in auscultation and percussion, in use of the body thermometer, the laryngoscope, ophthalmoscope, etc? What are they taught of chemical examination of the excretions, and of other indispensable means of diagnosis, so valuable and efficient in modern times? And then how often is the pupil permitted to go with the preceptor to the houses and bedsides of patients and study from day to day disease in just such forms and under such circumstances as must be met when the *pupil* has become the *practitioner*. To all these inquiries many, very many practitioners who have heretofore received pupils, must answer *guilty*. But for a few exceptions, the whole system of office pupilage must be pronounced a *shameful farce*. I am reminded that many practitioners are themselves incompetent to give proper instructions, and

others have not the time to devote to it. I am well aware that some are not qualified, either from want of acquirement, or want of adaptation and taste for teaching; others may not have the time. Let all such decline to teach, send their applicants to those who have the qualification, the time, and are willing to make the personal sacrifice. Such are often found to be the most active and laborious practitioners. With medical men, if not with others, it is generally true, those who have most to do have most time to spare. Under the above rule, the number of office instructors, as well as pupils would, no doubt, decrease. No serious matter. What would be lost in quantity might be gained in quality. As it is now, too many young men are seeking to enter the profession, simply as a matter of convenience or employment; often for no other cause than that they are warmly attached to the family physician, who becomes the preceptor. They have no just conception of the rugged and laborious path they must tread, the fearful resposibilities they are to assume, or the untiring energies and self-sacrifice, with which a life must be consecrated to their work, if usefulness and distinction are gained.

Now, my brethren, I have one plain and reasonable request to make of each—see that each young man who enters your office has the proper motive and metal, and having accepted him, consider yourselves sacredly bound to teach him faithfully.

CLINICAL AND HOSPITAL PRACTICE.

Hospital clinics are the popular demand of the day, so that the medical college which can not assure its matriculants of large and well filled hospital wards, to which they may have access, must expect to struggle on with small classes, and even be regarded and spoken of disparagingly by the representatives of schools more fortunately situated in this regard, and this too irrespective of the merits of the schools in any other

particulars whatever. This view is, I think, unjust. Not that I would underrate clinical teaching. All well informed gentlemen know that to the opportunities for more extended and systematic observation of disease and the results of treatment, under competent eyes, in hospital practice, medical science, and surgery, are indebted for many of the most valuable contributions of modern times.

The above statement applies with still greater force to pathology. In this department, owing to hospital advantages, for investigation, problems are now well understood which were for ages unanswered.

In this connection, it affords me great pleasure to testify, after an inspection of the principal hospitals in the eastern cities of our own country as well as on the other side of the Atlantic, that in hospital buildings, appointments, and medical management, Cincinnati compares favorably with any and is very far above most. Through the skill and industry of the medical profession, and the liberality of her citizens, she has not only provided amply for her unfortunate sick, but must inevitably become a great center for medical education. But, to return to what I started out to say. The size of a hospital or number of its wards or patients does not always fix the quality of its clinical teaching. The du Midi Hopital, which was for so many years so resorted to by students of medicine from all parts of the world, is a small and badly arranged building, containing but 450 beds all told. The name and fame of Ricord as a clinical teacher, drew such classes.

The celebrated Hôpital de la Charité is vastly inferior to the Cincinnati Hospital in dimensions and appointments, but the great attractions to her halls were Velpeau and Cruveilheir. Small hospitals, if supplied with efficient teachers, can furnish clinical opportunities which should not be ignored by larger ones. It may not be improper to state that if in such, the number and variety of the operations be

not so great, the opportunity of closer proximity to the operator is often more than compensating, and the same is true of examination of patients in medical wards. I have indulged these remarks, as I conceive in justice to medical schools connected with small hospitals. They should not be overawed. Their classes can not, of course, be so large, or their "natural advantages" so great, but their courses of instruction may be thorough, and their clinical material ample for their classes.

Now, having candidly commended both large and small hospitals, and being ready to endorse both high and low priced medical colleges, provided the standard be high, I wish to protest againt the modern proposition to dispense with private instruction, and have the student enter at once, and complete his whole course of study in hospital and college. Patients, other than surgical, usually treated in hospitals, are from a class of society whose occupation, mode of life, food and clothing, social condition, etc., have been so different that the types of disease in them are changed, and the treatment must be different from that which should be employed in private practice. Most of our text-books of practice, and especially those devoted to diseases of children, are defective and unsafe guides for the young practitioner from similar causes. Their authors have *observed* chiefly in hospital practice, and have thus been enabled to write well and learnedly but not always practically. We need badly some text-books, not as substitutes for, but as helps to, and correctors of those we have. I could name a score of gentlemen before me now, who could perform the task of writing them well. The field is ripe for your sickles; thrust them in.

Deny it who will, and there are some who do, American physicians are, as a class, as successful in practice as any in the world. They are practical and common sense in their physic as in other things.

"We want your experience and your common sense recorded for benefit of others. Notwithstanding it is not a fashionable confession, but one so snobbishly repudiated in some quarters now a days, still it is true, medical practice, with all our science, is immensely empirical, and so long as it continues so we want the results of your observations for guides.

WOMEN DOCTORS.

"Shall we encourage and consult with women physicians? I answer certainly, if they be regularly graduated from regular medical schools, and bear good character. I have no right to inquire a doctor's color, sex, religion, or politics. These are questions upon which people have different taste. Personally I would not marry a wife who was a doctress; others might prefer such from several considerations. Personally I would bitterly protest against my daughter or my sister becoming physicians. I have no right to speak for other fathers and brothers. I think a discussion of the comparative intellectual powers of the sexes in connection with this subject supremely ridiculous, so long as there is so much room for comparison among those already in the ranks of the profession, without having any regard to the sex. But these questions of difference among men and women too, are but in keeping with the spirit of the age. A writer in a foreign journal recently expressed the view that "this is an age of credulity," that men are ready to believe anything. It seems to me quite the reverse is true, that this is pre-eminently *an age of skepticism* and doubt, of questioning. Certainly independence of thought is more universal than at any former period. And under this spirit of questioning, doubt, and investigation, nothing is too sacred, or has too strong a hold upon men's faith to allow abandonment in case of doubt. Indeed the archers of science seem animated to all the greater zeal when they can direct their

arrows against an old creed, or doctrine, or historical statement, which has been attested by the world's great names. And as the warfare goes on the enthusiasm increases, and the huzzas of triumph are heard in every quarter. Much that is false will fall and pass away, and in my judgment, much that is true, will be obscured in the rubbish but only to come forth again, and challenge men's faith in the future.

Men had generally come to believe that about six thousand years ago man was created. Now, however, the naturalist cries out to us as he walks the path of science into the shadowy vista of the past, that man was not created at all, but was *developed*, that our ancestors were not quite monkeys but very like them, that they were at least distinguished by hairy bodies, long ears and tails; so that the best families are preparing now to destroy their family coat of arms; for it has come that he who can trace his genealogy the shortest distance back, must be acknowledged as possessing the best blood, as being the product of the highest results to be obtained by improvements in sexual selections. So that we may soon expect young bloods of the first families to deny that they ever had grand-father or grand-mother, possibly that they had any parents at all. So with the language of the human race. It had been pretty generally believed that "God spake to man," that human language was divine. Now, however, we learn in scientific circles that the first animals that could speak were of such low organization that they could articulate but a single sound, and that from this source man's oral teachers have come. Somewhat amusing, and possibly to some people mortifying; for who knows, to-day, but that the chatter of the goose is more harmonious and beautiful than the classic Greek, poetic Latin, or our own versatile Anglo-saxon tongue, to an ear sufficiently developed to appreciate it. In the generations that are past, here and there stood up men as intellectual giants, swaying the world's thought.

Heathen philosophy culminated in Plato, and then arose Aristotle. This man, born in poverty in an obscure, colonial town, shoots forth to a zenith of glory, thinks for the world, and issues laws for the government of men's thought in all time to come. Then Hippocrates, who becomes to the medical world what Aristotle was to the philosophical world. And in the 15th century Galileo becomes still a greater marvel in astronomy, mathematical and physical sciences; so that to-day the oscillations of a clock's pendulum, the revolutions of the earth, tracing of the processes of organic life by aid of the microscope, or beholding by the aid of the telescope the mountains and valleys of the moon, alike remind us of his greatness and the vastness of his researches and inventions.

Mohammed, the simple Arab, prays kneeling with his wife, and imagines that he receives a message: "There is but one God," a truth; "Mohammed is His prophet," doubtful. But he proclaims his faith and doctrine, under the promises of his wife to be his first disciple. And the result is that, since then nine thousand million of souls have professed his creed. But I have not time, nor is it proper that I should give further illustrations in this direction. My point is that the world's teaching, in the true and the false, was done by a few. Many things were accepted, simply on authority. Now, however, as before intimated, every thing that can be is rejected by the tests of science. Even Christianity itself is subjected to scientific crucibles, and with many minds stands or falls according to its conduct in the presence of scientific re-agents.

It is impossible in the present organization of thought, that intellectual monarchs, such as those to whom I have referred, shall either in the interest of truth or falsehood sway the world by their scepters. We are especially interested, therefore, as medical men amid all this cutting asunder, that we be sober, cool, honest, candid, philosophical, and pa-

tient, that we may walk in the light and find the truth. For certainly all I have said of other departments of thought and investigation applies eminently to medicine. I will be pardoned, at the expense of apparent repetition, in a few words in this direction.

In medicine, now, men believe nothing because it has the sanction of age or high authority. Every department of science is laid under contribution, in order to test the truth or demonstrate the fallacies of doctrines heretofore accepted; some of them attested with names all men love to remember and reverence, and mantled with the sacred garments of hoary ages.

Even the beautiful theories, and apparently irresistible and philosophical doctrines of the immortal John Hunter on Development and Absorption; doctrines which have for ages held in their grasp men's faith all over the world;—even these, Sir William Ferguson nervously said in his Hunterian oration recently delivered, "have, if not forgotten, been well nigh smothered in modern verbiage. Separate centers of life, new formations and growths, arrestments and changes of action, irrespective of blood and circulation, are among the fashionable doctrines of the day." * * He proceeds: "Molecular disintegration now takes the place of Hunter's 'disjunctive absorption.' Crude statements about veins doing what Hunter described as being done by the absorbents, doing what he positively showed by experiment they could not do; about pus circulating in the blood; about secondary deposits (as they are called) being the direct result of primary—ignoring the power of nature to make another, and yet another deposit, when she has already made one; rough experiments, which have no semblance to nature's action; modern methods of accounting for malignant diseases in various parts of the body, as being secondary deposits; are among the recent ways of tampering with the beautiful and philosophic views of Hunter."

So speaks one of England's greatest surgeons—the world's most dexterous operator. But his lamentations over the decline of Hunter's philosophy cannot save it from the common fate. The wonderful revelations of the microscope — pouring light upon the pathway of the physiologist as he investigates living tissues and peers into vital forces, in the lower animals and in man; the same marvelous illumination accompanying the pathologist in his journey amid the tissues of the dead, enables thus jointly the physiologist and pathologist to declare facts, and the theory of Hunter falls. A few years since, Liebig announced his most plausible chemical theory as to food in its relation to heat and nutrition. Liebig's name alone was authority sufficient to enforce adherence to his views; besides, his demonstrations seemed unanswerable. But to-day his theory lies prostrate as ruins amid the triumphal march of science.

No doubt, amid the enthusiasm and excitement incidental to tearing away the old temples and superstructures in medical science, erected by the fathers and defended by their sons—having in them as we think, with our better light, we can see, bad material and resting on bad foundations—we shall destroy some that are better than we can build again, unless we use the same brick and mortar and erect upon the same foundation. We should remember, as stated in the early part of this address, that, with all our knowledge, medicine is empirical; we should not allow the landmarks all to be destroyed. Science has done much recently. Under her light we are ashamed of some of our old paths, and would not be seen walking in them now. Still, with some of our most satisfactory results in therapeutic procedure, we are even yet compelled to accept the good result, without being able to tell how it is obtained. In order that we may not spread our wings too widely, let us name a few:

Quinine will positively arrest and counteract ague. Grand!

But how does it do it? No one knows. Colchicum cures gout. How? No one knows. Alkalies cure rheumatism; but how? No one knows. Chloral hydrate will relieve, almost instantly, supra-orbital neuralgia; but how? Well, we are informed that in the presence of alkalies of the blood it becomes chloroform, and this produces anæsthesia of the nerves. Very well; but the whole medical world is still in dispute as to how the phenomenon of anæsthesia is reached. Carbolic acid stands guard over wounded tissues, and prevents suppurative and gangrenous processes, and wards off many of the heretofore fatal complications of surgical procedure. How? We cannot tell. Some tell us by its antiseptic powers; by others we are informed that its wonderful work is accomplished by disinfection. How can we know, when we are not yet quite positive what the *infecting* or the *septic* agents are, or how they act? I am aware that theories, chemical and otherwise, have been offered as to the action of quinine in ague, colchicum in gout, alkalies in rheumatism, etc.; but none of them are capable of demonstration beyond peradventure, and some of those offered, as to alkalies particularly, are now disproven.

We may take some comfort that science has demonstrated, that mercury does not increase the secretion of bile in the liver of a dog; and that, by analogy, we are warranted in believing that the same is true of man. But no proof of a satisfactory character as to the latter; and certainly we have no explanation as to why a man who has furred tongue, an aching head, constipated bowels, with clay-colored stools, and, I may add, a jaundiced skin, is relieved of all these symptoms by a few doses of blue pill and salines.

But we have great reason to rejoice, notwithstanding all these unanswerable problems. I have no time to refer to the achievements of our profession in detail, although I can scarce desist. Eye and ear surgery have advanced within a few years marvelously. Extraction of cataract, treatment of dis-

eases of the middle ear, etc., new methods of examining cavities. By aid of the ophthalmoscope, utilizing the optic nerve as a telescope through which to watch the action of remedies upon the brain, etc. But I promised not to particularize, and will desist. All know that the victories of our profession are written on every page of its history. Under the influence of sanitary science and therapeutic skill, the average of human life is constantly increasing, so that men now live (many of them) beyond the scriptural allotment, and some of them in full vigor and strength.

Pharmacy has also made great progress within a few years past. The educated druggist has now become an able auxiliary to the physician. Now his skill in combinations and in preparing medicines so as to render them more palatable, vastly facilitates their administration, especially to children and delicate patients. Moreover, every year the standard of education in practical pharmacy required by druggists puts them at once in a position to be of great help to us, and we should hail them as our colaborers in a common cause.

Dentistry, another of our allies, to which we should extend the hand of fellowship and confidence. A few years ago, this science was simply an art, practised only by mechanics; now, however, microscopy, chemistry, physiology, and the very highest intelligence, are concentrated in this growing science. Pre-eminently is this true of American dentistry, which stands far in advance of that of any other country. Already dental colleges, State and National associations, are organized and in working condition. No longer is the dentist occupied with simply extracting natural and inserting artificial teeth; but his highest skill is called out in treating diseased mouths, and arresting decaying teeth. It is to me marvelous how apparently worthless incisors are restored under his skillful hands, to usefulness. If I have seemed to give too much prominence to this subject, my apology is the vast importance this science has assumed to our profession,

the gratifying and indispensable assistance rendered in many of our cases. I need in this connection but name the list of diseases due to indigestion, and this primarily to bad teeth.

And now I have done. Begging you to pardon me for detaining you so much longer than I intended or than was in good taste, and again thanking you for your friendship and consideration, let us adopt as our own the beautiful words of Whittier, written to a young physician:

The paths of pain are thine. Go forth
  With healing and with hope;
The suffering of a sin-sick earth
  Shall give thee ample scope.

Smite down the dragons, fell and strong,
  Whose breath is fever fire;
No knight of fable or of song
  Encountered foes more dire.

The holiest task by heaven decreed,
  An errand all divine,
The burden of our mortal need
  To render less, is thine.

No crusade thine for cross or grave,
  But for the living man.
Go forth to succor and to save
  All that thy skilled hands can.

Before the unveiled mysteries
  Of life and death, go stand
With guarded lips and reverent eyes,
  And pure of heart and hand.

So shalt thou be with power endued
  From him who went about
The Syrian hill-paths doing good
  And casting devils out.

That holy helper liveth yet,
  Thy friend and guide to be;
The healer by Genesaret
  Shall walk the rounds with thee!

SOME POINTS

IN

Uterine Therapeutics.

BY EDWARD B. STEVENS, M. D., CINCINNATI, O.

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At the last meeting of the Society I was designated to read a paper on *Uterine Catarrh;* but since that date such exhaustive papers have been published in this country upon this subject by gentlemen of far better opportunities for observation than my own—that I have thought it of more profit to myself and the Society to change my plan; and instead of a mature report upon a single topic, to give a more superficial review of some of the more important points pertaining to general *Uterine Therapeutics.*

I need not remark to gentlemen upon the extent or interest of the field which such an inquiry opens; within a comparatively short time gynecology has really assumed wonderful proportions, and not only our ideas of its importance have greatly developed, but certainly all will agree our real and precise knowledge of the character and modes of treatment of uterine diseases has singularly developed.

It is, perhaps, true that women of the present day are more subject to these forms of diseases than their grandmothers; it would be natural to expect this; with the growth of a great country comes the luxurious habits and tastes pertaining to civilization; the slaves of fashion, and dress, and dissipation, in their endless forms, become inevit-

ably subjects of varied forms of *invalidism*, to which women of purer and simpler habits are utter strangers. But aside from these considerations, we are mostly prepared to admit that we have been steadily progressing in more accurate estimates of both the pathology and Therapeutics of *Uterine Diseases.*

In traveling thus far, it is not by any means strange that very opposite and extreme views have been honestly entertained by excellent and observing authorities. Take for example the ultraisms of the Bennett school on the one hand, and the like ultraisms of Rigby and West.

The Bennett school, doubtless, have been disposed to ignore the necessity for constitutional measures of treatment, and narrowing down their pathology to one or two local affections, have placed undue stress upon the corresponding plans of local treatment! But, nevertheless, this school has done much to advance correct ideas, and without doubt we may properly associate a large proportion of the most important recent advances in gynecology to their industrious efforts and teachings.

Rigby may be looked upon as the opposite extreme of ultra opinions—an extreme, perhaps, produced by the ardent views of Bennett. At the present time, however, it is difficult to understand how so eminent a man could deliberately express such opinions as these: "Neither do I consider that organic disease of the female generative organs is to stand as an exception to the importance of constitutional treatment! for I look upon it as no more than a *fragment* of a constitutional malady." Again: "I can no more look upon inflammation of the os and cervix as a primary disease, causing derangement of the general health, etc., than I could on a gouty toe, a rheumatic knee joint, or enlarged strumous gland. *Most* of these uterine affections are the local manifestations of *some general derangement.*" Or still again: "Ulceration of the os and cervix uteri

(when unconnected with malignant disease,) *is a very simple affection* of the mucous membrane covering those parts, and *like ulceration of the throat and tonsils,* must be rather looked upon as a local result of constitutional derangement, *and treated* accordingly." (Rigby, 1857.) So excellent an authority, too, as Dr. West, is very distinct in similar views of the superior importance of constitutional in preference to local treatment for the graver affections of the uterine structures.

It will not do to regard the teachings of such men with indifference; and there is a probability that many of us in adopting what may be supposed more advanced notions, have vibrated toward the opposite extreme, and in a measure lost sight of the value of general medication. So too, I fancy, that while Bennett was an ultraist in that he discovered almost an universal presence of ulceration of the os uteri, some of us, just now, are alike extravagant in the detection of universal conditions of endo metritis.

We all realize too seriously, how fashion governs us, and we find ourselves yielding to its control insensibly but still certainly; and this is more true, perhaps, in the field of gynecology, than in any other department of our profession. What we want is the discriminating, careful, accurate judgment that will enable us firmly and independently to adhere, in our views of uterine pathology, and the proper therapeutic procedures, to the happy medium so well sung by the old Roman poet, ages ago.

Not losing sight of the associate necessity in many cases of graver treatment, I may remark that there is a strong tendency, as just hinted, to rely on local measures; some of these recently becoming prominent, I propose briefly to notice; but first of all, nothing is more plausible than the idea that if the organic lesion is plain and primary, therapeutics direct is of chiefest import. In many cases this is undoubtedly true. Thus, Dr. Field, of Boston, relates a case

of retroflexion with uterine inflammation, producing persistent constipation by virtue of the mechanical interference of the displacement; local treatment for the retroflexion, and a gradual reposition of the organ, with local treatment for the metritis, restored speedily the functions of the bowels. But such cases are exceptional, and while the organic trouble is the primary seat of attack, nevertheless, the tendency is soon to implicate the whole system. The nervous system responds; the blood-making capacity becomes involved; and with long continued local pain, yet she becomes, by and by, dispirited, broken down, devitalized, and in a variety of ways and directions a successful plan requires constitutional treatment. In some of these conditions of long standing, the alterant treatment by mercury, or mercury and iodide of potash, as urged by Dr. West, is doubtless of value. But mercury is by no means our only or chief therapeutic agent. The value of iron, in some form, to build up and restore depraved or impoverished blood, is too well known to require comment. Most of us, I presume, have learned the wide range of utility secured by the use of bromide of potash, as well in states of nervous derangement, as conditions of an inflammatory character. Arsenic has an important place, as an alterant, and particularly as some very good observers have thought, in the *constipation* of uterine diseases. In my own experience I have thought the nux vomica or strychnia was more efficient in meeting this indication. The judicious administration of this list of drugs will certainly facilitate the cure of these cases, and properly combined with the local therapeutics, will be *found to hasten the desired results.*

OPERATIONS.

The comparative impunity with which grave surgical operations have been performed upon the uterine structure, within a few years past, is something remarkable in view of

revolutionized the uterine surgery of modern practice. It may not be amiss, in this connection, to allude to one or two of these. For the relief of the obstruction produced by an irremediable anteflexion, the operation proposed by Sims, and as modified by Emmett and Thomas, is to cut through one wall of the cervix, or remove a wedge of the wall, and thus substitute a straight canal for the crooked one. As just remarked, it is singular how little of unpleasant consequences has attended this operation; the philosophy of the suggestion seems plausible, but if we understand the recent reports of Dr. Emmett the results of the procedure have not been as satisfactory as was originally claimed or anticipated; and we suspect it will be found that much of the "cutting and carving" of this structure will ultimately be found to be far from the innocent character that ambitious gynecologists seem to imagine.

Of the same character would seem to us to be *amputation of the neck.* Under certain circumstances there can be no question of its propriety, and the operation has been performed ever since the days of Ambrose Pare; but for simple hypertrophoid states and conical elongation, as is suggested, we cannot omit this occasion to express a word of deprecation. But to continue in detail a review of these surgical points would be needlessly to extend this paper. We will only notice one operation further that has been recently performed by Prof. Thomas, of New York, for the relief of obstructive dysmenorrhœa. Instead of making a rapid dilatation of the cervical canal by means of the hysterotome section, he proceeded simply to pare off from about the os a ring of tissue. Dr. Thomas claims both entire immunity from danger to the patient and successful results.

We turn to another field of brief inquiry. The relative former opinions in reference to the safety of this sort of interference; and we find that Emmett and Sims have almost

tolerance of the gravid as compared with the unimpregnated uterine cavity to the influence of foreign invasion is remarkable. Ever since the pathology of the profession has become somewhat clear as to the nature of metritis and especially endometritis, there has been a strong feeling that some plan of intra uterine medication must surely be best adapted to the rational and speedy cure of these cases.

Now, Dr. Mendenhall, some years ago, reported the efficacy of applying persulphate of iron in solution within the cavity, for the arrest of post partum hemorrhage; and other practitioners have adopted the same practice with safety; but here we have a fully dilated condition of the os, and there is no retention of the fluid. On the other hand, very small quantities of the blandest fluids have been forced within the uterus in the normal condition of the os and cervical canal, and frequently with the effect to produce terrible pain and symptoms of too grave a character to justify such procedure except upon most careful and guarded methods.

To this end we now resort to processes of dilatation. Dilatation of the cervical canal is accomplished in several ways and serves several useful purposes.

Means of dilatation are of themselves therapeutic as well as diagnostic; a dilating body is curative by virtue of the *pressure* it produces upon the cervical wall, and thus often itself is of advantage aside from the additional means afforded for other applications. Dilatation enables the attendant to more satisfactorily explore the canal and the uterine cavity. Dilatation enables us to overcome the narrowed or constricted cervical canal, which frequently produces an obstructive dysmenorrhœa. Dilatation affords the necessary convenience of access for intra uterine therapeutics, as well as means of exit for fluids simple or medicated which it may be desirable to introduce.

Dilatation has its dangers. It frequently causes pain; the dilator itself may produce irritation and inflammation.

The means generally employed are some form of tent, or metallic bougie. Each has its advantages and objections. *The sea-tangle tent* is smooth, is readily introduced and free from irritation; but it dilates slowly and to a limited extent. When there is no reason for haste, it answers well, and its expansive power may be increased by inserting several slips of the sea-tangle, side by side. *The sponge-tent* is more frequently used; I prefer it myself because it accomplishes its work more readily. It is more liable to become charged with offensive fluid, but this may be corrected by proper medication, and the time necessary for retaining it is at any rate not very protracted. A more serious objection made by Dr. Nott is the probable fact that the expanded sponge affords a surface of irritating points to the delicate tissues of an inflamed cervical canal; but I have never observed this result.

The hysterotome. Some prefer to incise the cervical canal completely with the hysterotome, following with a large sponge tent. This is rapid and complete, but the process of cicitrization is likely to nullify the final result, and as a general procedure seems to us objectionable.

Metallic dilators. Instead of tents, metallic dilators are employed by some as the more satisfactory plan. Dr. Nott prefers a form of dilating forceps, which he describes in the *American Journal of Obstetrics.* (Nov. 1869.) Without any practical experience in this instrument, I should yet think it promises to be worthy of favor. But the graduated sounds, especially the set of curved sounds of Kammerer, seem the most complete instruments devised. They are so graduated as to present a small sound to commence the process, and the increased sizes may follow at such intervals as the judgment of the attendant may approve; operating

precisely upon the same plan as the surgeon overcomes a strictured urethra.

But now having by some of these processes secured the free dilatation of the canal, we may, with comparative impunity, proceed to *wash out* the uterine cavity, and apply to its surface such agents, fluid or otherwise, as may be indicated.

The intelligent treatment of chronic endometritis now seems brought within comparative reach, we may bleed this inflamed surface, with Storer's Scarificator, just as we would the delicate vascular structure of an inflamed eye; we may paint the surface with such alterants as chronic acid, or iodine, or some of the various agents fitted to change or modify the condition of the living membrane.

But that which is particularly interesting is to feel quite well assured that with these preliminary precautions, we may inject this susceptible cavity for purposes of cleaning or medication, with scarcely any fear of the uterine colic so liable to occur otherwise. In a number of cases in which I have injected the uterus with this previous dilatation, there was no more disturbance, than from passing nitrate of silver into the cervical canal, scarcely so much.

Artificial impregnation. It would be improper to omit, in this connection, a brief allusion to a matter that is partly therapeutic, partly physiological, and certainly among the novelties of uterine therapeutics. I allude to the proposition to produce impregnations by artificial means. The proposition is to introduce the male sperm into the uterine cavity, thrown up by means of a delicate uterine syringe. Whether the husband is first to have sexual congress with the wife, or to perform masturbation, and thus afford the needed seminal fluid, is not stated. In any event the whole idea appears disgusting to the thoughts and customs of plain-minded Americans.

Of course, nothing is indecent that is absolutely necessary

for the comfort or well being of our patients; we are not to be over squeamish in our sentimentalities, but the process certainly savors much of the mode of propagating frogs.

Finally, these points of review would naturally suggest to us, a consideration of the interesting field of intra uterine injections. To comment upon this would open up matters too extended for the proper limit of this paper. Besides, the contributions of Drs. Nott, and Peaslee, and Kammerer, seem to leave nothing more to say. There is, undoubtedly, a growing disposition just now to make this form of therapeutics available, and we believe it promises to contribute very materially to our valuable stock of resources.

REPORT ON

Physical and Vital Force.

BY S. S. SCOVILLE, M. D., OF LEBANON, O.

REPORT ON

Physical and Vital Force.

BY S. S. SCOVILLE, M., D. OF LEBANON, OHIO.

GENTLEMEN OF THE OHIO STATE MEDICAL SOCIETY.—An elaborate report upon a subject of such magnitude as the one assigned your committee, would occupy more time than is usually granted the Special Committees of this Society; a brief consideration of the questions involved is all that we can promise.

It shall be our purpose to consider the Doctrine of the Correlation and Conservation of Force in its application to Physiology.

A brief history of the discoveries pertaining to the new philosophy, as it is sometimes called, may not be out of place, especially when we may recognize among the individuals who participated in the solution of the difficult problems so many who are identified with the medical profession.

In looking back upon the past we find no period when philosophers were satisfied, or united in their opinions respecting the nature of heat. Phlogiston and caloric, in their turn, were by many regarded as real existences; but the great body of thinkers were suspicious of their equivocal character, and hesitated in declaring them the true representatives of that something which effects matter called heat. To say the least, phlogiston and caloric had miserable lives,

and some may predict a like fate to the giant form which heat is now made to assume.

It appears that Galileo, Newton, Bacon, Locke, Leibnitz, Laplace, Des Cartes, and others of their age, had vivid conceptions of the intimate relation of the physical forces, and it may be shown that Des Cartes, respecting the vital forces, was sipping at the very foundation from which Huxley and Herbert Spencer have recently taken such copious draughts.

In speaking of the motion of blood Des Cartes says, "This motion, which I have just explained, is as much the necessary result of the structure of the parts which one can see in the heart, and of the heart which one may feel there with one's fingers, and of the nature of the blood, which may be experimentally explained, as is that of a clock of the force, the situation, and the figure of its weight and of its wheels."

Again in reference to the human organism he remarks: "It is not necessary to conceive any other vegetative or sensitive soul, nor any other principle of motion or life, than the blood and the spirits agitated by the fire which burns continually in the heart, and which is nowise essentially different from all the fires which exist in inanimate bodies."

In their scientific labors these men approached the very confines of the philosophy of to-day. Count Rumford's experiment with heat, first published in 1798, utterly demolished the caloric theory, and gave to the world the first clear conception of heat as a mode of motion. Sir Humphrey Davy, who early abandoned the old theory, was cautious in adopting the new; but his genius and zeal for experimental philosophy soon led him to the views of Rumford. Notwithstanding the brilliant achievements of these philosophers, scientific men, generally, were slow to apprehend their great significance; and more than third of a century elapsed before attention was fully directed to the consideration of the important truths evolved.

About the year 1842, W. R. Grove, Dr. Joule, Dr. J. R. Mayer, Colding of Denmark, and Sequin of France, announced their views respecting the mutual relation of forces. In 1850, after assiduous labor, Dr. Joule completed the discovery respecting the mechanical equivalent of heat. Dr. Mayer, however, seems to have preceded Joule in all the principles connected with this law. Prof. Tyndal, in referring to this matter, says: "As seer and generalizer, Mayer, in my opinion, stands first; *as experimental philosopher, Joule.*" Dr. Faraday, Prof. Helmholz, and Prof. Liebig, also, were conspicuous in these discoveries pertaining to the forces; their views, however, were not announced quite as early as those of the other gentlemen named.

What are we to understand by the phrases, Correlation and Conservation of Force? In the introduction to a work published by Dr. Edward L. Youmans may be found a clear and satisfactory answer to this question. This author says: "Heat, light, electricity, and magnetism are now no longer regarded as substantive and independent existences—subtile fluids with peculiar properties, but simply as modes of motion in ordinary matter—forms of energy which are capable of mutual conversion. Heat is a mode of energy manifested by certain effects. It may be transformed into electricity, which is another form of force producing different effects. Or the process may be reversed; the electricity disappearing and the heat reappearing. Again, mechanical motion, which is a motion of masses, may be transformed into heat and electricity, which is held to be a motion of the atoms of matter, while by a reverse process, the motion of atoms, that is, heat or electricity, may be turned back again into mechanical motion. Thus a portion of the heat generated in a locomotive is converted into the motion of the train, while by the application of the brakes the motion of the train is changed back again into the heat of friction.

"These mutations are rigidly subject to the law of quan-

tity. A given amount of one force produces a definite quantity of another, so that power and energy, like matter, can neither be created nor destroyed; though ever changing form its total quantity in the universe remains constant and unalterable. Every manifestation of force must have come from a pre-existing equivalent force, and must give rise to a subsequent and equal amount of some other force. When, therefore, a force or effect appears we are not at liberty to assume that it was self-originated, or came from nothing; when it disappears we are forbidden to conclude that it is annihilated: we must search and find whence it came and whither it has gone; that is, what produced it and what effect it has itself produced."

For a complete illustration and demonstration of the truth of the above, Grove and Tyndal should be consulted.

The law of the mechanical equivalent of heat has been so repeatedly demonstrated that no philosopher now entertains a doubt respecting its truth. We find it stated thus: A pound-weight falling from a hight of 772 feet will generate enough heat to raise the temperature of one pound of water one degree; or, conversely, an amount of heat necessary to elevate a pound of water one degree will raise a pound-weight 772 feet. Perhaps this law, in its application to science, is of equal importance to any law discovered by Newton or Heplar.

The theory as to how heat operates as a mode of motion rests upon the existence of an ethereal substance, which, it is supposed, pervades all matter surrounding or enveloping the atoms or molecules. Heat, in a body, becomes manifest in proportion to the degree of motion induced in the atoms or molecules. In the combustion of any substance we have an exhibition of intense molecular motion, and if this molecular or heat-motion is communicated to water, the atoms will become so excited as to pass away as steam, and if properly collected may be made to produce powerful mechanical force or motion.

In passing to the consideration of the relation which is claimed exists between the physical and vital forces, we find that Dr. Mayer was the first to make a clear and emphatic announcement claiming the identity, or at least the correlation of these forces. This was in the year 1845. Dr. William B. Carpenter, Prof. Liebig, Prof. Joseph Henry of the Smithsonian Institution, and Prof. Leconte of South Carolina College, followed in the advocacy of similar views. Carpenter and Liebig may be regarded as pioneers in this new field of science. The views of the former were first published in 1850, and he, Dr. Carpenter, claims that the labors of Dr. Mayer were not then known to himself; this, we believe is admitted. More recently, Prof. Huxley and Herbert Spencer have become conspicuous, especially in the application, and in popularizing the "new views."

Dr. Mayer in his first treatise labors to show that the changes in living organisms, including plants, take place by forces acting from *without.* He also treats of motion, light, heat, and electricity as produced by living bodies.

Dr. Carpenter's views as announced in 1840, in a memoir entitled "The Mutual Relation of the Vital and Physical Forces," are substantially the same as those of Dr. Mayer. In 1864 he published several essays in which he discusses the same subject. In an appended note he makes the acknowledgment that he has been profited by a memoir from Prof. Leconte published in Silliman's American Journal for November, 1859.

Dr. Carpenter in one of his essays makes use of a figure which well illustrates the relation which exists between the *force* or *power*, and the *instrumental means* through which the force or power operates. This is an important matter in considering the phenomena of force or motion. We give his language: "If we inspect a cotton factory in full action, we find it to contain a vast number of machines, many of them but repetitions of one another, but many, too, presenting the

most marked diversities in construction, in operation, and in resultant products. We see, for example, that one is supplied with the raw material, which it cleans and dresses; that another receives the cotton thus prepared, and "cards" it so as to lay its fibres in such an arrangement as may admit of its being spun; that another series, taking up the product supplied by the carding machine, twists and draws it out into threads of various degrees of fineness; and that this thread, carried into a fourth set of machines, is woven into a fabric which may be either plain or variously figured, according to the construction of the loom. In every one of these dissimilar operations, the *force* which is immediately concerned in bringing about the results is one and the same; and the variety of its products is dependent solely upon the diversity of the material iastruments through which it operates. Yet these arrangements, however skillfully devised, are utterly valueless without the force which brings them into play. All the elaborate mechanism, the triumph of human ingenuity in devising, and of skill in constructing, is as powerless as a corpse without the *vis viva* which alone can animate it."

Here the Doctor, so far as it concerns the factory, would consider heat as the life power. And we shall see in another place that he concludes heat may be the force or *vis viva* of the human machine. In speaking of living organisms, he says: "When we look carefully into the question, however, we find that what the *germ* really supplies is not the force, but the *directing agency;* thus rather resembling the control exercised by the superintendent builder, who is charged with working out the design of the architect, than the bodily force of the workmen who labor under his guidance in the construction of the fabric. The actual constructive force, as we learn from an extensive survey of the phenomena of life, *is supplied by heat,* the influence of which upon the rate of growth and development, both animal and vegetable, is so

marked as to have universally attracted the attention of physiologists, who, however, have for the most part only recognized in it a *vital stimulus* that calls forth the latent power of the germ, instead of looking upon it as itself furnishing the power that does the work."

In the application of this new doctrine respecting the forces, we find that it is made to embrace the operations of the intellectual faculties. Carpenter, in his Physiology, discusses the matter at some length. Draper indorses the view that all mental manifestations can be made to correlate with the forces of organic or animal life. But no author, to our knowledge, has treated the subject with as much enthusiasm as Spencer. He not only extends the doctrine to the operations of the mind, but he gives it a universality that embraces all the relations and conditions of mind and matter in the universe. Whatever else may be said of his views, as contained in his "First Principles of Philosophy," they bear the mark of rare genius in the way of application. And we do not find him wanting in material facts. His education, and associations as a physician, gave his mind ample range for the collection of material, out of which he has reared a gigantic structure, the durability of which time must determine. But it is not our purpose to examine the mental and moral phases of the question, and we pass to the consideration of the forces in their operation in connection with organic life.

Prof. Henry, in an article entitled "Meteorology in Its Connections with Agriculture," published in Patent Office Report for 1857, discusses at some length the phenomena connected with both vegetable and animal life. As it regards the vital forces, his views accord, in the main, with those of Dr. Carpenter. The vital principle he considers to be that which *governs* or *directs* the forces. He says: "This" (the vital principle) "is certainly not a *force*, in the ordinary acceptation of the term, or in that in which we confine this

expression to the attractions and repulsions with which material atoms appear to be primarily endowed. It does not act in accordance with the restricted and uniform laws which govern the forces of inert matter, but with forethought, making provision far in advance of a present condition for the future development of organs of sight, of hearing, of reproduction, and of all the varied parts which constitute ingenious machinery of a living being. Matter without the vital influence may be compared in its condition to steam which, undirected, is suffered to expend its power in producing mechanical effects on the air and other adjacent bodies, marked with no special indications of design; while matter under its influence may be likened to steam under the directing superintendence of an engineer, which is made to construct complex machinery, and to perform other work indicative of a directing intelligence. *Vitality*, thus viewed, gives startling evidence of the immediate presence of a direct, divine and spiritual essence, operating with the ordinary forces of nature, but being in itself entirely distinct from them."

This view," he continues, "of the subject, is absolutely necessary in carrying out the mechanical theory of the equivalency of heat and the correlation of the ordinary physical forces. Among the latter, vitality has no place, and knows no subjection to the laws by which they are governed."

In an appendix to an article by the Rev. H. H. Higgins, found in the report of the Smithsonian Institute for 1866, Prof. Henry adheres substantially to his views as contained in the article from which we have just quoted.

The operation of external forces in building up organic structures may be shown in the growth or development of plants. Prof. Henry discusses this matter with great clearness, and we regret that space will not allow us to give his views in full, and in his own language.

A grain of corn placed in the ground, and kept below a

certain temperature, will not germinate. If any change takes place in the molecules of the starch and other matter of which the grain is composed, it is that of decay. And by this disintegration the compounds are run down into those of a less complex character—to purely inorganic matter. But suppose the grain or kernel is so conditioned that a certain amount of heat from the sun can penetrate the earth and warm the germ; soon a rootlet is sent downward, and a sprout shoots upward; both in search of something which the plant must have when the supply in the kernel is exhausted. What will become of the plant should the new supply not be found? Its growth ceases, and it falls back into decay. But it "seeks the light," and light it *must* have, especially the chemical rays. This chemical emanation, or force, from the sun, decomposes the carbolic acid which has been absorbed by the water in the pores of the surface of the young leaves; the oxygen is liberated, and the carbon is absorbed to build up the woody structure of the plant.

When a plant or tree is burned, the ash, which is but a small part, represents that which was obtained from the earth; that consumed in combustion came from the atmosphere.

In the evolution of the animal organism, we may find substantially the same conditions—the forces concerned in the process being derived from without. In the development of the chick from the egg, heat is essential, though according to nature it is not derived immediately from the sun. Animal heat obtained from the parent serves no better purpose in incubation, than that directly from the sun, or from an oven, only so far as the mode of its application is better adjusted. And we might have stated, that in the germination and growth of plants, the *source* of the heat is a matter of no *essential* importance.

Heat induces motion, sensible motion, in the embryo-cell, and in the highly-organized compounds stored up in the

egg; and in this manner evolution is initiated. What degree of motion, or *vis viva*, existed in the egg before being warmed by the parent, may be difficult to determine. But that there must have been motion, beyond the molecular disturbance common to all matter, is evident from the fact that respiration, or an interchange of oxygen and carbonic acid, is, to a limited extent, going on within the egg from the time of its first contact with the external air. And when incubation has commenced, this respiratory action increases in proportion as the process of development advances. But with all this pre-existing motion, evolution would never take place in the absence of a certain quantity of heat—motion coming from without. And to withhold this heat or energizing influence, at any time before the chick emerges from the shell so that it can take food and breathe freely, thus enabling it to generate its own heat, would be to let it perish—just as the young plant would, if the heat were withdrawn before it emerges from the earth in search of new supplies necessary to its life and further development.

The adjustment of heat during the process of incubation, directed in some manner by the instinct of the parent, is quite remarkable. With some fowls, it may be noticed in the care taken to cover their eggs when they leave the nest. And in proportion as evolution advances—the circulation becoming more active in the new being, and respiration through the shell increasing—we find the parent less careful as to the amount of heat which she is to furnish her eggs.

That the animal organism is dependent upon forces from without, is evident from the fact that its capabilities for force and power always bear an exact relation to the force-producing material taken into the system. And the same principle applies to a piece of human mechanism—the locomotive for instance. Experiments, however, have shown that the machine, man, is so much superior in its adjustments for utilizing power, that four and a half times more work can

be done by it, with the same amount of fuel, than can be performed by the best finished engine.

The matter which enters into the animal organism to form structures, is in a very unstable condition. And the higher the organism attains, the more unstable the equilibrium becomes.

We are forced to the conclusion that with the more stable compounds, whether organic or inorganic, there is constantly less molecular or continued motion. And as heat increases this motion, we may understand how the stability of matter is affected by temperature—a most important consideration in all our investigations respecting animal life.

As it regards inorganic bodies, the crystalloid form, which is due to a union or certain arrangement of the individual atoms, there is more stability; in the other, the colloid form, which is due to the union of groups of individual atoms, there is less stability.

Perhaps all elementary bodies possess the quality of assuming active and passive conditions; which is owing to a difference in the arrangement of atoms or molecules, giving them different degrees of contained motion. Carbon, in the form of diamond, contains but little molecular motion, with feeble capacity for an increase of this motion, as proven by the difficulty encountered in its combustion. In the form of lampblack it must contain great motion, from the fact of its ready ignition. Under certain circumstances it ignites spontaneously. Phosphorus is changed from a highly active concondition to one of passiveness, by exposure to certain rays of the sun.

When this allotrophism of bodies is better understood, much that is now involved in mystery may be explained.

In all the nitrogenous compounds we find an unstable condition, consequent upon their contained motion. It is found that when nitrogen combines with other elements, instead of giving out heat, it absorbs heat. This heat, then, seems

locked up in the compound formed. And we may mention the fact that our explosive compounds are nitrogenous. In the explosion of nitro-glycerine, we may witness a most terrible display of heat-motion, or decomposition taking place instantaneously.

In this proneness to decomposition, of compounds into which nitrogen enters largely, we have an explanation of the unstable condition of the animal tissues; for the more essential compounds of all animals are nitrogenous.

The relation of heat to life is so intimate that, in our investigations, we are compelled to recognize its importance at every step. In the requirements of the human system for maintaining a uniform temperature, we have a striking exhibition of this relation. Dr. J. Davy, in his investigations respecting the temperature of the human body, (Carpenter's Phys., edi. 1868, p. 407), examined one hundred and fourteen individuals of both sexes, of different ages, races and latitudes, and under different external temperatures, ranging from 60° to 82°. The average age of all persons examined was twenty-seven years. The variation of the temperature of the body, as the result showed, amounted to but 5½°.

The highest temperature noted was 102°, the lowest 965°. This variation could, in part, be accounted for by the difference in the external temperature of the air, and individual peculiarities.

In disease we may witness a departure from the normal standard, amounting to more than 40°. In tetanus, scarletina, phthisis, puerperal fever, and typhus fever, we may have a temperature of the body ranging from 106° to 110°; while in asthma and cholera it may fall as low as 75°. With the latter disease, cases are recorded where the temperature was but 67°.

In disease there seems to be a general relation between the temperature of the body and the rapidity of the pulse. There is also another relation, which is better understood since

thermometry has come into use, namely, between the temperature of the body in a given case of disease, and the mortality attending it. Very high, or low, temperatures indicate mischief.

In the experiments of M. Chossat upon starvation, it was found that certain birds which were deprived of food and drink, suffered a gradual diminution of temperature. In the course of four days the heat had diminished 4½°. During the fifth day, at the close of which death took place, the temperature fell 25°, making a total loss of 29½°. It was found that 93 per cent. of the *fat* had disappeared, while the nervous centers lost comparatively nothing. Here, evidently, the heat was maintained at a gradually declining rate until the combustible material was consumed, when the temperature suddenly fell, producing death.

The same gentleman shows that birds, when death is impending from starvation, may be revived by artificial heat so as to take food and drink, which they could not do without this stimulus. Many, upon which experiments were tried, entirely recovered; and some, it is said, that were dead to all appearances, were resuscitated.

The chemical theory of calorification may be supported by a multiplication of facts to which we cannot refer. If heat in the animal system is essentially dependent upon nervous agency, to the exclusion of chemical action, or changes in the arrangement of the elementary particles, then, says Professor Liebig, "It means nothing else than to derive the presence of motion, the manifestation of force, from nothing." Carpenter in this connection refers to vegetable heat, where the idea of nervous agency is totally excluded; also to the *post mortem* production of heat in the human subject.

Dr. Bennet Dowler, of New Orleans, found that with certain subjects of yellow fever the *post mortem* heat arose several degrees above the highest temperature during life. In one case mentioned, "the highest temperature during life

in the axilla was 104°; ten minutes after death it was 109°; fifteen minutes afterwards it was 113° in an incision made in the thigh."

The temperature was noted with five different subjects, in eight different regions, and at different times; the thigh gave the maximum, the brain the minimum—respectively 109° and 100.6° In one subject, three hours after the removal of all the viscera, a fresh incision in the thigh indicated a temperature of 110°. The heart also was very persistent in its manifestations of this molecular life.

If heat were essentially dependent upon nervous agency, we would expect the brain to indicate the highest temperature—certainly not the lowest.

This *molecular life*, continuing so long after *somatic death*, is evidence of high muscular endowment. And it is but reasonable to suppose that the parts of the body which are expressly formed in all their minuteness for motion, would persist in exhibiting motion of some kind, longer than parts formed and endowed for other purposes.

We cannot look to nervous agency for the origin of animal heat. The nervous tissue doubtless contributes its share to the general sum of heat, the same as all matter in the system susceptible to chemical changes. That the amount of heat, especially in certain parts of the body, is influenced by nervous agency, cannot be denied; but, perhaps, only in proportion as an influence is exerted upon the circulation of the blood and other fluids.

As it regards vegetable heat, where nervous agency is out of the question, Prof. Pain's experiments are interesting. (Draper's Phys., 7th edi., p. 479). In the examination of the bodies of twenty trees, embracing eleven varieties, by boring holes into them, and inserting a thermometer nicely adjusted, it was found that the temperature ranged from 48° to 68°; while that of a dead tree, selected as the standard of comparison, showed, at the close of his observations, but 45°.

These experiments were conducted in a forest in New Jersey, on the 9th of April, when some of the trees were in bloom, with others the buds were but slightly swollen.

There are two stages in the life of plants, when they exhibit high temperatures, namely: during the germination of the seed, and the functional activity of the flower. In the malting or sprouting, for instance, heat is evolved, and upon the same principle that it is with animals; oxygen disappearing, and carbonic acid being liberated. A mass of flowers, it is said, has raised the thermometer from 60° to 121°. Here the same interchange of gasses are carried on, with the temperature raising precisely in proportion to the amount of oxygen consumed.

Pursuing the relation of heat to animal life, we shall discover that there is with all organized beings a fixed relation between the temperature maintained, and the capacity of respiration. In birds, where we find the respiratory apparatus most perfect, the temperature of the body is 110°.

Draper, in his physiology, adduces satisfactory evidences of the truth of this relation. And in discussing the matter, remarks: "That since muscular motion implies destruction of muscular tissue by oxydation, and therefore development of heat, we should expect to find, and is actually the case, that animals possessing the highest powers of locomotion will possess also the highest temperatures."

In tables of mortality we may trace distinctly the relation of heat to life. At the annual maximum and minimum of temperature, we find the greatest number of deaths, especially with infants and aged persons, whose power for adjusting the heat of the system are less perfect.

Were we to examine in detail all the functions of animal life, named by physiologists, we would witness the presence of heat as influencing every process. And the same may be said in relation to the various changes which take place in inorganic bodies.

If the functions of animal life are carried on by a vital principle—a principle *sui generis*—a *something* unlike anything else in nature, then it is folly to pursue such a principle with theremometers, test-tubes, ballances, and other philosophical appliances; it could never be described, should it be apprehended.

In the preface to his Animal Chemistry, (edited 1850) Prof. Leibig remarks: "The most beautiful and elevated problem for the human intellect, the discovery of the laws of vitality, cannot be resolved, nay, cannot even be imagined, without an accurate knowledge of chemical forces."

As it regards gastric digestion, the more recent observations favor the idea that the process, at least so far as the change effected upon the food is concerned, is chemical. And respecting nervous agency in connection with this function, the experiments of M. Bernard, Dr. John Reid and Sir Benjamin Brodie, prove that digestion is only *influenced* by the nerves.

Prof. Carpenter (Carpenter's physiology, edited 1868, p. 116) referring to the experiments of these gentlemen, remarks: "It must be held as demonstrated by these experiments, that all the arguments which have been drawn from the effects of lesion of the pneumogastrics upon the functions of the stomach, in favor of the doctrine that secretion *depends upon* nervous agency, must be set aside. That these nerves have an important *influence on* the gastric secretion, is evident from the deficiency in its amount soon after their section, as well as from other facts."

The experiments of Dr. Beaumont upon the famous St. Martin, show that the change wrought upon the food may be effected as completely in gastric juice removed from the stomach, as it is in the stomach; provided the proper temperature is maintained by artificial heat. It was found that a longer time was required, which depended much upon the want of motion such as the stomach could furnish.

Did space permit we might refer to experiments in producing artificial digestion, showing that the process can be, at least, well imitated.

In the case of absorption from the digestive cavities, must we look for some mysterious vital operation? Or does this function depend upon physical or chemical laws?

The opinion that absorption may be referred to osmotic action, is being strengthened in proportion as this physio-chemical force becomes better understood. Prof. Lehman (Lehman's physiological chemistry vol 2d, p. 273) advances the opinion, that when a full investigation is had respecting the laws governing endosmosis, we will be able to trace, not only the normal but the abnormal "circulation of matter in the body to purely mechanical conditions."

Experiments by Joseph Jones, (Carpenter's physiology, p. 139) student of medicine in the University of Pennsylvania, with solutions of various substances, show that there is chemical change connected with endosmosis. In placing, for instance, a solution of chloride of calcium upon the insides of the intestines of a raccoon, while a solution of oxalate of ammonia was made to occupy the other; after diffusion had taken place, crystals of various shapes were found deposited in the solution occupying the inside of the membrane, such as could not be formed when these solutions were placed in immediate contact.

Experiments with different membranes, and with different substances, were attended with similar results.

Septa of dry membranes, and those composed of inorganic substances, were used. The diffusion of the solutions took place readily, but was not attended with crystalline deposits. But this, it is thought, does not prove that chemical action is absent in the process. It shows that these septa are insufficient to produce upon chemical substances passing through them, a change of molecular arrangement.

As to the force of osmotic action, it is found that a pressure

of several atmospheres may prove insufficient to control or arrest it. And liquids will pass through pores which are imperceptible by the aid of the microscope.

If organic substances alone could induce or cause endosmosis to take place, we might with some propriety suspect that the action depended upon a vital principle, and dismiss the further consideration of the question, with little hope of ever knowing anything respecting it. But it is found that porosity is the essential condition upon which the action depends, and that it will readily be induced by septa formed of inorganic substances.

Draper regards osmotic force as purely physical; and is very emphatic in attributing absorption to its influence. And to this force he refers secretion, excretion, capillary circulation, and various other operations connected with the animal organism.

Carpenter is never so positive, yet the sum of his reasoning leads to the same conclusion.

With this brief consideration of osmotic force, we pass to notice muscular motion.

In the muscular system, the great embodiment of animal force, with its various connections and relations to the bony frame-work of the body, we have a purely mechanical arrangement, capable of producing an almost infinite variety of motions, all of which are as obedient to physical laws as the motions of a machine constructed of purely inorganic matter. But what causes these physical or mechanical motions as exhibited in a living being? What is the character of the antecedent force? To suppose that it is *vital*, or a force *sui generis*, is to suppose that two forces totally unlike each other, have a reciprocal relation—a relation so intimate that the existence of one depends upon the existence of the other. Such an idea is preposterous. If the force or motion that causes the flexion of the arm is *vital*, and the force or motion of the arm itself is *mechanical* or *not vital*, then that which

is *vital* is transmuted or changed into that which is *not vital.* And if it can be shown that this mechanical or *non vital* force of the arm can, of itself, induce muscular contraction, then we have the process reversed—a *non vital* force turned back into a *vital.* But can we suppose that such a condition or relation really exists? Must we not conclude that these forces, which stand in the relation of cause and effect, are either *vital,* or *non vital?* Or, in other words, that they are but different manifestations of a single force or motion?

That the muscles are endowed—constantly charged as it were, with force, ready to be liberated by some disturbing influence—needs no argument. This disturbing influence, especially with the higher order of animals, operates through nerves, which are formed expressly for this office. Muscular force could not be intelligently appropriated without some connection between the muscles or magazines of force, and the directing principle which "presides in majesty over all."

This *influence,* whatever it may be, which operates through the nerves causing muscular contraction, must be regarded as a force, and as being distinct from the *directing* or *governing principle* which lies beyond, and which cannot be regarded as a force in the ordinary acceptation of the term.

If no influence except that which operates through the nerves, could cause muscular contraction, then the whole affair would be involved in impenetrable mystery. But we find that nervous influence is only one out of many, which will induce contraction. Pointed instruments, magnetism, electricity, heat, various liquids and gasseous substances, and purely mechanical force, as blows from the hand will cause muscular fiber to contract. In certain yellow fever subjects, Dr. Dowler was able to cause violent contraction of entire limbs by blows from his hand. For several hours after respiration had ceased, contractions could thus be produced.

That muscular contraction necessarily involves disintegration of tissue, is an admitted fact. The experiments of

Helmholtz upon amputated muscles, in which motion was produced by electrical currents, places this question at rest.

Respecting the heart's action, it is shown that the nervous system exerts an *influence* only. It does not *cause* the motion. The single fact that pulsation is observed to commence in the embryo-heat when its walls consist of ordinary cells, and before nervous structure is observed to exist, in its own substance, or in the body at large, is sufficient upon this point.

The heart, like all other muscles, acquires force—capacity by the nutritive process. And as regards its rythm, it has been suggested that it is nourished to such a degree as to necessitate contraction in order to relieve itself of tension or accumulated force, and then immediately acquires new energy sufficient to repeat the same action.

We must concede an amount of nutrient supply to this organ in proportion to the force expended, and the consequent disintegration. To reason otherwise, would be to conclude that it could persist indefinitely in producing force from nothing. According to Dr. Myer, the joint force of the ventricles, for every twenty-four hours, would raise 303,000 lbs. to the height of 1 foot. And if the heat had to furnish the matter necessary to its action, it would be consumed by oxydation in eight days.

We may readily conceive that where there is exalted nutrition in muscular tissue, and consequently much tension, comparatively slight influences would induce motion, or greatly modify it where it already existed. This condition we find obtains with the heart. Slight mental emotions, for instance, are sufficient to influence it very considerably in force and rythm. And we find it further illustrated in the hearts of certain fish and reptiles. When this organ is removed from the body, it may be excited to action which will be maintained often for hours, by very feeble stimulation.

Dr. J. K. Mitchel, of Philadelphia, in dissecting a sturgeon,

removed the heart, placing it upon the ground, where after a time it ceased to pulsate; but upon being inflated with the breath and hung up to dry, it resumed its action which was kept up for ten hours. But before its motion entirely ceased, the auricles had become so dry as to rustle as they contracted and dilated.

With the heart of a *Testudo Serpentaria* or snapper, it was found that oxygen, hydrogen, carbonic acid and nitrogen, caused pulsations. Water, also, induced action for a brief period.

With this high endowment for motion, the heart can not of itself produce this visible motion. Its movement is *caused,* and not *self-originated.* We are compelled to preclude the idea of independent or isolated motion as belonging to anything. And were we to seek for a true *vis insita,* we would never find it. Every effection of matter, so far as it is given to us to know, has its antecedent.

In the contraction of a muscle the disturbing influence does not operate at the same instant upon any considerable part. The motion seems to commence in certain parts of particular fasciculi, and in isolated points along the fibrils. These initiatory movements spread or accumulate, and when sufficient force is thus aggregated, the muscle, as a whole, contracts. And could the mind grasp the infinitude of members, we might form some idea of the multiplication of molecular or cell motion in a muscle, in order to produce mechanical motion such as may be witnessed in the extension or flexion of a limb. The number of cells or molecules in a muscle, must be overwhelmingly great, since we are told that thirty thousand fibrils, each a foot in length, may weigh but a single grain.

Referring again to the rythm of the heart, we conclude that this motion is not a strange one, since it may be observed throughout all nature. We may see it in the quivering of leaves, and tossing of boughs; we may hear it in

the "voice of many waters;" and may feel it in all the undulating and jarring sensations to which we are subjected. In the slight jarrings of a railroad car we have an illustration. And we may experience the significant fact, that these slight rythms or jarrings of the car, may culminate in rythms of greater length of motion, such as the oscillation of the whole car.

All motion is attended with rythm; though the beats or repeats may occur at such remote intervals that memory will fail to connect them; or they may take place so rapidly that the eye, even the ear, can not perceive them. Rythm is simply a repetition of motion. It may require years, even ages, for the motions of some of the larger masses of matter in the universe to be repeated; while other motions, such as effect minute particles of matter, may be repeated in the smallest fraction of a second. Matter vibrating or repeating its motion 38,000 times per second, may be appreciated by an acute ear, but an increase beyond this fails to effect the ear, much less the eye.

There is but one condition imaginable where motion could be had without rythm. If there existed in the Universe but one object, and this in motion, it would continue to move forever in a direct line, without increase or diminution of velocity. Action and reaction would be out of the question.

In the steam engine we have good illustration of aggregated molecular motion, not only producing great power, but regular rythm. The rythm is caused by the piston acting and reacting upon the steam.

Another illustration: suppose we have a bridge, composed of some elastic material, whose span, it may be, is two hundred feet in length; a body of soldiers commence passing over it, soon we shall see the bridge and soldiers as a whole, oscillating. This rythm of great length and power, is but the aggregation of a number of smaller rythms ob-

served in the limbs of the men. And these smaller ones may have been compounded from those still smaller.

In molecular oscillation we have the very essence, so to speak, of rythm. In a lecture by Prof. Tyndall, delivered before the University of Cambridge, May 16, 1865, on Radiation, may be found a clear exposition of molecular oscillation, caused by either waves set in motion by heat. So far as it regards gasseous bodies, it is shown that the atoms or molecules, have certain definite rates of oscillation.

From even a general survey of the subject, we may arrive at the conclusion that the rythm of the heart, is not a strange phenomenon; but that it is dependent upon a law of motion, which may be observed throughout all nature, effecting inorganic as well as organic matter, in a similar manner.

As it regards all phenomena, whether physical or vital, we must conclude that heat as a mode of motion, plays a most conspicuous part. Its importance and universality are such as to suggest the idea of its being the progenitor of the other modes of energy which effect matter. But where we have the different states or conditions of the same thing, as the new doctrine respecting the forces teaches, such a relation is not admissible. We can, however, attach a primary importance to heat; especially when we are told by some of the greatest philosophers living, that should the heat of the sun fail to reach the earth, all visible motion would soon cease. And ultimately the whole face of the earth would be cooled down to the temperature of space, which is some two or three hundred degrees below zero; then, it is concluded, all atomic motion would be arrested.

In conclusion, suppose that it should be fully established that what are called the vital forces are but the ordinary forces of nature; what have we gained? We shall only remark that all the branches of Medical Science, especially physiology, pathology and therapeutics, must be rendered

less obscure; and the sciences generally must assume a definiteness hitherto unattained; and yet, with all this advancement, we may be far from reaching the confines that separate between the Knowable and the Unknowable.

REPORT

ON THE

Antagonistic Power of Opium and Belladonna.

Read before the Ohio State Medical Society. By Jno. A. Little, M. D.
Delaware, Ohio.

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ANTAGONISTIC POWER OF OPIUM & BELLADONNA.

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Owing to the limited extent of my personal observation upon this interesting and important subject, it is with much hesitation that I attempt to make a report thereon. Believing, however, that even one marked case in one's personal experience, when fully sustained by the statistics of many other cases of equal authenticity, ought to have weight in influencing the opinion of the profession, I submit the following report.

I do not propose to advance any new ideas, or to advocate any new theory upon this subject. The evidence before the profession is sufficient, I think, to warrant the assertion that there is a well marked antagonism between these two remedial agents. My effort shall be, by the statement of a few interesting cases, to so impress the mind of the profession with the value and importance of the fact that, in cases of emergency, they will have confidence to act promptly and efficiently, and with a feeling of assurance of success, even in cases which, under other circumstances, would be utterly hopeless. There are but few occasions more trying and embarrassing to the physician than those of poisoning, whether it be the result of accident or suicidal attempt.

The knowledge of, and the possession of, a reliable antidote lifts a mountain of responsibility from his shoulders.

It is entirely unnecessary on this occasion to give the botanical history and therapeutic action of these medicines, for with these we are all supposed to be quite familiar. As to the *modus operandi* of medicines, I believe we are considerably in the dark. There is much speculation upon this subject, also a great deal of theory and guess work. Some things we do know from experiment which we accept as facts.

For instance: it has been pretty well demonstrated that opium is a narcotic and produces sleep, whilst belladonna is a delirient and is not apt to cause sleep. Moreover, that opium produces relaxation of the capillary bloodvessels, whilst belladonna causes contraction of the same. Opium seems to exercise its greatest influence upon the nerves of organic life, thereby producing a slow pulse and slow respiration; also contraction of the iris. On the contrary, belladonna acts directly upon the nerves of animal life, increasing the frequency of the heart's action, and the respiration, and causing dilatation of the iris.

It is easy to see how chemical poisons may be antidoted by chemical processes, one by combination with another producing a third, which is either inert or innocent. It is not so easy to understand how one vegetable medicine, whose action is probably entirely upon the nervous system, should be antidotal to another whose action is essentially in the same direction. This, however, appears to be the case in these two medicines. Hoping that the report of a few characteristic cases will satisfy the profession as to the fact of the antagonism of these two medicines, I will proceed to relate them as concisely as possible.

The first will be cases of opium poisoning.

At half past nine o'clock P. M., on April 11th, 1870, my friend Dr. J. H. White called hurriedly at my office for a

stomach pump. On inquiry I found that two hours before two-thirds of a teaspoonful of laudanum had been given to an infant not quite four months of age, in mistake for Winslow's syrup. It was an hour after it was given before the error was discovered. Dr. White found the babe quite narcotized, but still able to swallow. He had for an hour endeavored with ipecac, tartrate of antimony and sulph. zinc to produce emesis, without success. He had given remedies to as full an extent as he thought safe. I told him that the time for evacuants of that kind had passed, and that as the poison was already absorbed, and was then going the grand round of the circulation, the stomach pump would be of no avail. He must antidote the poison. He asked what would answer the purpose. I assured him that belladonna would do so. We immediately visited the patient. It was comatose, though not to such an extent but that it could swallow the antidote. Had it been so I should have resorted to hypodermy. The surface was cold and pallid, and the respiration slow; the pulse too feeble to be counted; the pupils were contracted to a small point. We gave at once fifteen drops tinct. belladonna. After the expiration of fifteen minutes, being unable to see any effect from the antidote, the dose was repeated. In another fifteen minutes there was a slight dilatation of the pupil observable, and the temperature of the surface was better, as was the respiration also. Still we gave a third dose of fifteen drops. We then waited half an hour, when dilatation was so decided and consciousness was so much improved, that I felt confident the babe was safe. Still to make sure I gave fifteen drops more, and told the parents they could take the babe to bed with perfect assurance of its safety. I called the next morning and found the patient perfectly well, with the single exception that the pupils were dilated to the full extent. I have no doubt that its vision was much disturbed, though it was not old enough to tell us so. No other medicine was given. If

there is no antagonistic or antidotal property in these medicines, it would be very interesting to know what became of that large dose of laudanum. It is certain that not a drop of it was evacuated. Also it would be interesting to know how an infant of less than four months could take in the course of one hour sixty drops of a good tincture of belladonna with perfect impunity.

Dr. G. R. Patton, in the *Lancet and Observer* for June, 1869, reports the case of a lady to whom, at three o'clock P. M., of April 10th, he gave two grains of morphia hypodermically, for severe neuralgia. He says that in less than five minutes all pain had subsided, and there was decided symptoms of narcotism. In ten minutes her case was altogether alarming. Pulse, 30; respiration, 10; profound coma, pupils contracted. Between artificial respiration, electricity and atropia, he chose the last. Deglutition being impossible, he at once gave one-sixteenth grain of atropia, hypodermically. After waiting a few minutes, and observing no effect, he injected another one-sixteenth grain. In five or six minutes he found that the pulse could be counted, the respiration more frequent, the pupils dilated a little, surface becoming warmer, but insensibility still complete. He then injected another one-sixteenth grain of atropia. In fifteen minutes afterwards the pupils had dilated to a mere rim, and there was a partial return of consciousness. By ten o'clock she was comfortable, but feeble, and by ten o'clock the next morning she was well.

He very properly remarks that "the antagonistic action of opium and belladonna is now so clearly recognized that we may, with great confidence, have recourse to either, one as remedial of the effects of the other, in any case in which a poisonous dose has entered the circulation."

Dr. C. C. Lee reports, in *The American Jour. Med. Sciences,* the case of a child, aged two years, to which laudanum had been given in an unknown quantity, probably for the pur-

pose of infanticide. He says, "enough, however, had been swallowed to render a fatal prognosis almost positive." The tincture of belladonna was instantly given in doses of fifteen minims, repeated at intervals of twenty minutes, until four doses had been taken. "Soon after the fourth dose the child exhibited every sign of the first stage of belladonna intoxication." The medicine was discontinued, and soon the child was to all appearances well. "No vomiting or other disagreeable sequela occurred."

Prof. Wilson, of the Women's Med. College at Philadelphia, relates a case of poisoning by repeated injections of sulph. morph. of ¼ grain. He says, "within a short time after receiving the last dose, which must have been somewhat larger than the preceding one, she became comatose, with a suffused and purple countenance, stertorous respiration, contracted pupil, and complete insensibility." One quarter grain of atrophia was administered, hypodermically. "The pupils were quickly (almost instantly) fully dilated, with complete insensibility to light, the stertorous breathing ceased, and was replaced by quick, hurried, almost gasping respiration."

Symptoms of belladonna poisoning were well marked. I have no doubt that the antidote had been administered more freely than was necessary. Nevertheless, the patient made a rapid and perfect recovery.

Dr. M. S. Buttles relates, in the *Med. Record,* of Aug. 15, 1868, a case occurring in his own practice which shows the efficacy of belladonna in cases of poisoning by opium. He had given in the course of twelve hours, two hypodermic injections of sulph. morphia, of ½ grain each time. Within thirty minutes after the last injection the patient was narcotized. The respirations were but seven to the minute, no pulse at the wrist, pupils contracted, and extremeties cold. Atropia was administered hypodermically, two doses of one-sixtieth grain each, with an interval of half an hour. In

less than one hour consciousness was restored and the patient out of danger.

Dr. B. F. Reynolds, of Hulton, Pa., reports, in the *Med. and Surg. Reporter*, for Aug. 1868, an interesting case in which a mother had given, by mistake, from half to three-fourths of a teaspoonful of laudanum to an infant but five weeks old. He gave fifteen drops of tincture belladonna at intervals of a few minutes. The babe was saved.

Dr. Norris, of Phila., reports, in *The American Jour. of Med. Sciences*, a case, in which, as near as could be estimated, the patient had taken seventy-five grains of sulph. morph. In the course of five or six hours, fifty grains of ext. of belladonna were given, in connection with other remedies. The next day the patient was well. Dr. Norris, also, in the same paper, gives, in tabular form, the history of ten cases of opium poisoning treated by belladonna. He states the amount of opium taken, the condition and age of the patient, the amount of belladonna given, and the result. There was only one fatal case. This is sufficient for opium poisoning.

I will now invite your attention to a few cases of belladonna poisoning treated by opium.

This is of much rarer occurrence, partly because it is not so much used medicinally, and never to my knowledge for suicidal purposes. It is generally the result of accident. Children are often tempted by the inviting appearance and flavor of the berries to eat them. Sometimes collyria made from atropia, or the extract of belladonna, are taken in mistake for other medicines.

Dr. Horing, in 1868, relates the case of a child three and a half years old, that swallowed a solution of one grain of atropia in three drachms of water. Vomiting occurred, and very promptly symptoms of poisoning. A subcutaneous injection of $\frac{1}{8}$th grain of morphia was promptly practiced. Very soon a decided improvement in the condition of the

child took place. The pulse fell at once from 160 to 120 the respirations from 32 to 28. By the end of forty-five minutes consciousness and speech had returned. In a few hours the child was fully restored, with the exception of some dilatation of the pupils, which continued a few days longer.

Dr. Lee, in *The American Journal Medical Sciences* relates the case of "a child, aged six years, to which had been given, in mistake for syrup of rhubarb, a drachm of succus belladonna, an unofficinal preparation, very concentrated, and only used in collyria. The characteristic symptoms of belladonna poisoning were almost immediately apparent; the child's face became scarlet, and it tottered insensibly to the floor." Dr. Lee says he "was instantly sent for, and found the flush on the face deepening to a violet hue, the eyes fixed and staring, the pupils dilated to the utmost, tongue dry, pulse slow and bounding, and the child almost comatose. Twenty drops of laudanum by the mouth, and the same by the rectum were simultaneously given, and at intervals of half an hour the dose of twenty drops was repeated, until the little patient had taken one hundred and twenty drops in all. After the third dose the pupils began strongly to contract, the purple hue of the face to fade, and in three hours the child was well and running about the room.

Dr. Norris, in his table of cases before referred to, gives the data of fourteen cases of belladonna poisoning treated by opium, all but one of which were cured. In this case the pupils remained dilated; in all cases which recovered the pupils contracted before sleep. He also gives a record of four cases of poisoning by atropia treated by opium, all of which were cured. Many other cases are on record, but these I believe to be sufficient to demonstrate conclusively the mutual antagonistic properties of these medicines. If this is true, it is a matter of importance that it should be fully appreciated by the profession. The idea of this an-

tagonism is not of recent date. I find that many years ago it was acted upon to a certain extent.

There seems to be among the profession some degree of timidity in regard to the use of belladonna. It is apt to be looked upon not only as a very potent, but also as a very dangerous remedy. Compared with opium I believe it quite safe. The poisonous effects of opium come on so insidiously, and their approach is so gradual, that they are often not detected until there is complete narcotism. It is not so with belladonna. The largely dilated pupil, and the erythematous rash, give warning in time. One reason why those who unsuccessfully have attempted to antidote opium by belladonna, or vice versa, is that their dose of the antidote has been far from commensurate with the amount of poison taken. It is of importance to approximate as nearly as possible to the amount taken, and regulate the antidote accordingly. It must be constantly borne in mind that poisonous doses of one must be met by equally poisonous doses of the other in order to be successful. It is clearly proven that one which in ordinary circumstances would be poisonous, is not only innocent, but salutary, when there has been a poisonous dose of the other taken. If these characteristic cases which I have related will contribute to satisfy the profession of the value and importance of the subject, and tend to inspire confidence in this mode of treating poisoning by these drugs, the object of this report will be fully accomplished.

Case of Removal of both Superior Maxillary Bones.

BY W. H MUSSEY, M. D.

Case of Removal of both Superior Maxillary Bones.

BY W. H MUSSEY, M. D.

The subject of the operation is Andrew Mayhew, colored, 36 years of age, formerly of Clarksville, Tenn.

In 1854 he received a blow upon the left superior maxilla, which caused a fracture; necroses resulted and many pieces of bone were discharged from near the outer canthus of the eye. In 1855 a tumor as large as a hen's egg appeared in hard palate, which was cut out by Dr. McKinney, of Clarksville. In 1861 a tumor of the size "of a walnut" was observed directly under the molar bone; in five years it had increased to the size of a "hen's egg." One day, whilst working, was struck by a barrel directly upon the tumor, which was followed by great suffering, lasting five weeks, then there was noticed a swelling of the roof of the mouth, which gradually increased till in October, 1870. I had the photographs taken which I now exhibit. The whole of the left maxilla was involved, and in the right anterior nares was noticed a large development.

October 26th. After etherizing the patient I made an incision from the inner angle of the eye down to the ala of the nose and along the upper lip to its center, and down through its margin, reflecting the flap outwardly; then I passed a saw through what remained of the alveolus at the point of the left central incisor; the mass was seized and

depressed into the mouth and enucleated. I then attempted to enucleate from the antrum of the right side the remaining portion of the tumor; this resulted in removing the larger portion of the right maxilla, as the walls of this bone had almost entirely disappeared, there being only a thin wall of the alveolus remaining, two molar teeth remained in the deossified alveolus, which dropped down the throat, nearly producing strangulation; I seized the inner angle and stitched it up to a portion of the membrane from which the tumor of right side was detached. The integument was united with the interrupted suture.

There was considerable hæmorrhage which was controlled with ice and iced water. After the patient was removed to his bed there was still too much oozing of blood. To stop it iced water was injected and a bladder containing pounded ice was applied over the left side of the face. After two hours there was no bleeding. Morp. sul., ¼ grain, ammonia carb., 5 grains, whisky, ½ oz., was given every two hours. At 8 P. M. morphia was omitted and the carbonate of ammonia and whisky continued every four hours.

27th, 7 A. M. Has slept much, no pain, pulse 100, bowels freely moved spontaneously; copious discharge of a ropy mucus tinged with blood.

6 P. M. No change in condition since morning. Beef essence and the whisky has been administered by a syringe with a long nozzle carrying the fluid back into the fauces.

28th, 7 A. M. Has slept well, the discharges are offensive, and the following is ordered:

℞ Liquor sodæ chlorinat. ½ ounce. Aquæ distillat. 8 ounces; to be used freely in washing the cavity.

Nov. 1. The conditions all favorable.

Nov. 2d. Considerable febrile excitement. Bowels confined.

℞ Fl. Extr. Sennae, 1 drachm every 4 hours until effective. Also,

℞ Potass. Chlorat., 1 drachm.
Quiniae Sulph., 16 grains.
Tinct. ferri Muriat, 2 drachms.
Aquæ font.
Syrup Simpl., each 2 oz.

Misce—Sig., 2 drachms, 3 times a day.

Nov. 4th. Patient much improved; stitches removed from wound; adhered by first intention.

Nov. 8th. Condition excellent. From this time there was a steady improvement until 23rd of November, when the patient was discharged.

I am indebted to J. M. McCormick, M. D., Resident Physician of Cincinnati Hospital, for the care of the patient and the record of the case. You will notice that the patient, whom I now present to you, is but slightly disfigured. The molar bones and the nasal bones are all preserved, as, also, the soft palate with a large portion of the covering of the hard palate. There is but a small hole in the roof of the mouth. This serves for a fixed point for the plate of teeth, which Dr. J. Taylor, a young and promising dentist of this city, has provided for the unfortunate man. On the upper plane of this plate is attached a piece of vulcanite, curved so as to hook into the orifice in the roof of the mouth.

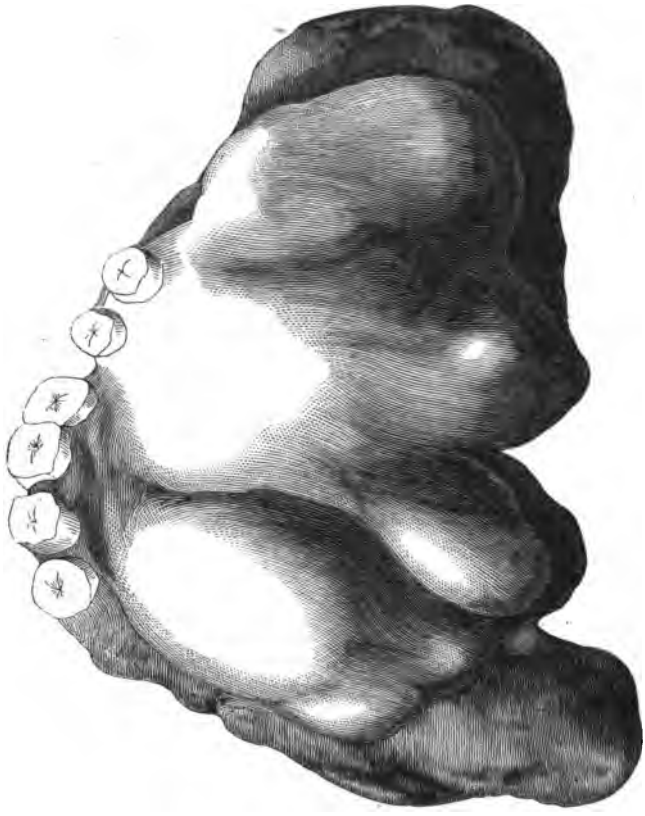
There is no evidence of a malignant character in the tumor.

The patient is entirely well, August, 1871.

NOTE. The cuts of the tumor here presented, exhibit in No. 1, the front aspect, and in No. 2 the buccal surface.

Number 1.

Number 2.



Sanitary Science.

BY DR. J. R. BLACK, OF NEWARK, OHIO.

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Man's thoughts in his lowest mental state, move in a very limited circle. This circle thrown upon the widest sphere of thought of a day dwindles to a mere point—a point so small that astonishment might well be excited at the fact that intelligent beings can be content to think within it. From this small point man has advanced slowly upon the unknown, upon the wonders and mysteries above him, below him, and around him. Beyond his sphere of thought all is dark and dreadful; within it, thanks to the illuminating power of reason, there is light, more or less of it, to cheer and guide him. The illuminating power of the intellect does not move uniformly upon the ever widening circle of nature's mysteries; some giant gifted minds throwing light far into the darkness which environ it on every side, save on the point of advance. A number of such minds uniting in projecting knowledge in some special direction carries it far in advance of the general circle, when owing to the correlations and dependencies that exist among all its branches, a further advance is impossible until the darkness which envelops it to the right and left is dispelled. The light thrown in one direction upon the mysteries of natural phenomena, illumines collateral fields less or more, so that, while making search for the true explanation of one thing, another mystery in a related branch of knowledge for which no search was being

made is unexpectedly made plain. Thus it is that knowledge sought in some directions, is advanced by the force of genius, in others, it is advanced by light incidentally thrown upon it while seeking to understand another. In the latter category must we place *Sanitary Science.* Like medicine it has had no Galen or Harvey, like chemistry no Day, like astronomy no Copernicus or Newton. No brilliant intellects have brought sanitary science abreast, far less to the advance of sister branches of knowledge: what little progress has been recently made being mainly due to light thrown upon it while cultivating branches to which it is related. Let any one read "*Hufeland's Art of Prolonging*" life, written about a century ago, and he will be made aware how little real progress has been made in knowledge of the ways and means through which health is destroyed. Compare the information received to-day on chemistry, on physiology, on geology and on astronomy, with what it was a hundred years ago, and it will be at once apparent that school boys know more of these branches now, than scientific men did then; yet on the subject of hygiene even the grey haired physician of to-day may read Hufeland with profit.

A union of causes has served to keep this important branch of knowledge in such a state of backwardness. Foremost among them is the idea, long prevalent, of the enevitableness of the disease. It is assumed either that nature, or nature's God is inimical to man's healthy existence; and if one or the other is at war with our nature, knowledge will not avail us. If, for example, the processes of nature, or the wrath of the Deity every now and then send forth the agents of disease and death, I, with others, can see no more hope of the future than the past. But such a deadening fatalistic view, subversive as it is of all sense of responsibility for the evils which befall us, is fast passing away under the light of experience and advancing knowledge. The history of the past exhibits the fact that knowledge of the causes of disease has

progressed just as knowledge has in other branches of information. In this progression we may also discern an age corresponding to that of stone, of brass and iron; or more oppositely, according to the physical arrangement of Draper, an age of superstition, an age of faith, and an age of reason. The age of superstition as to the origin of disease prevailed everywhere in primitive times, and is continued to this day. among all savage peoples. They imagine all their disorders to come from some supernatural source, from evil spirits, evil eyes and from the anger of their gods. The Indian believes disease to be the work of an evil spirit, the equatorial African, that every sick man is bewitched, and when he dies, that the one who bewitched him must be instantly put to death, else there would be no safety for any one in the tribe.

Everywhere in ancient times, and at the present day among all barbarous nations the offices of priest and physician are united. This union had its source in the belief of the spiritual origin of disease. The pagans in times of danger from pestilence consulted the oracles and frequented, with offerings, the temples of Esculapius and Hygeia. Indeed it is eminently fit that if diseases arise from spiritual wickedness or sin, the work of their alleviation or cure should be entrusted to those consecrated as guides in spiritual matters. It was not until the beginning of the seventeenth century that the supernatural era began to give way, and the populace of any nation could be persuaded to take any other than spiritual measures to avert the destructive sweep of epidemics.

The sum of the precautions taken in London, whose squalidness and filth Erasmus and Macaulay so graphically depict, to guard against oft repeated visitations of the plague, was to isolate the houses of the stricken, putting a red cross on the doors, with the words, "Lord have mercy on us." Up to that time as Renouard remarks, "pestilential epidemics had been generally regarded as a scourge from heaven, whose progress no human barrier could arrest, and no more efforts

were made to preserve the people from its ravages than are made among Mussulmen."

To show that the same idea is yet extant, modified it is true by religious faith, it is only needful to refer to the petition of the clergy of England to the late Lord Palmerston to appoint, in view of a threatened visitation of Asiatic cholera, a day of fasting and prayer. This answer well embodies the existing state of sentiment upon this point in our ranks. "The best course," said the Prime Minister, "which the people of this country can pursue to deserve that the further progress of the cholera should be stayed, will be to employ the interval that will elapse between the present time and the beginning of next spring in planning and executing measures by which those portions of their towns and cities which are inhabited by the poorest classes, and which, from the nature of things must most need purification and improvement, may be freed from those causes and sources of contagion, which if allowed to remain will probably breed pestilence and be fruitful in death, in spite of all the prayers and fastings of a united, but inactive people."

Every day observation serves to show that we can discover no relevancy in health and disease to righteousness and wickedness. A man is often seen pure in spirit and in deed, and yet a life-time victim to terrible disease: another, vicious and wicked, and yet a perfect marvel of health and strength. Yet it is quite obvious that while the bulk of mankind believe diseases to be sent by a power whose ways are past finding out, will it subvert the idea of personal responsibility for their productions; and hence, of faith in the means of avoiding them. Every proposition looking to the abrogation of disease will thus be regarded as an impossible or impractible scheme, and many of the claims of sanitary science will be treated with an indifference, or with disdain.

The age of faith in etiology may be said to have originated with Hippocrates. To him is due the honor of separating for

ever the healing art from the ecclesiastical function; and of showing that the source of disease is not supernatural but natural. He believed and taught that diseases arise from the rotations of the seasons, from regimen and temperament producing a ripening of the humors; and that the cause of epidemics was to be found in special constitutions of the atmosphere. Sydenham and Stohl believed in this secret epidemic constitution, and very many medical men of to-day yet have faith in its existence. Of course so long as this notion prevails will there be skepticism justly, as to man's power to prevent, or exterminate pestilences.

In no small degree does this view of nature's responsibility for disease, or that there is such a thing as an epidemic atmospheric condition also serve to keep sanitary science in the background.

If there really is, what so many virtually claim, an unfitness in our natural surroundings to sustain life in a healthful manner, the hope of our ever being made free from so much disease must indeed be dim. We can not hope in coming time to be able to remove the asperities of climate, the fluctuations of heat and moisture, the perturbations of electricity, the processes of growth and decay, and the rotations of the seasons. If these are the prime agencies which serve to make the earth an unfit habitation to sustain life in man in a healthy manner, then indeed is he doomed to wallow in the old substratum of evil. But, on the other hand, if the lack of adaptation to our natural surroundings arises from a weakening of the body by the infringement of organic laws, whereby the external forces gain an ascendancy over us which they do not normally possess, then may the hope that our race may be relieved from the grasp of disease, be warmly cherished. We have only to live accordantly with the laws of our being, or, in other words, give the force of life in us a good chance, when it will rise superior to disturbing causes from without. I might, had I time, enlarge on this

point, and show, by what seems the most incontrovertible evidence, that this constitutes the era of reason in etiology and furnishes the true explanation of the apparent unfitness of human life to the conditions amid which it is placed; man so impairing and depressing vital action that it is at the mercy of conditions perfectly normal. But I have already been too long at the threshold of my subject.

Sanitary science, or the regulations designed to secure health, are conveniently divisible into ten rules or laws. These laws, it is thought, embrace all the uses man is justified in making of himself, as well as the scope of his relations to nature in a sanitary point of view. The exposition of each law must be necessarily brief, and far from containing all its etiological applications; a labor not required when addressing those habituated to reflection on the subject of disease. Still, it is sometimes needful to jostle imperfect and unsatisfactory modes of thinking somewhat roughly, especially when they have become smoothly and deeply grooved by the wear of centuries, else there can be no progress. It is a peculiarity of great age to be distrustful of recent improvements, calling them new fangled devices which seem to bode more of evil than of good, or more of error than of truth. It is needful that while we are commonly deemed, and perhaps justly, the most conservative representative of the healing art, that our conservatism should not degenerate into bigotry, nor into an undue reverence for the past, but hold fast only to that which is indubitably true, and hold lightly to that which is uncertain, or merely traditionary, ever ready to welcome truth and light whether coming from the obscure or the eminent in our profession.

The first law to which I ask your attention is, *breathing a pure air.* Twenty-five thousand nine hundred and twenty times every twenty-four hours does the human chest expand and contract so as to draw air into the lungs and throw it out again. What goes, or was designated to go into the lungs

is vitalizing, what goes out is life destroying. The mere fact of air being *expelled once* from the lungs is *prima facie* evidence of its unfitness again to inspire. Expired air is not only richer than ordinary air in carbonic acid, but it contains the animal rinsings from six hundred millions of air cells, exceedingly destructive to warm blooded life.

Pure air is the natural food of the lungs, for they consume a part of it just as much as the stomach does bread—and they need fresh food, not three times a day, but more than twenty-five thousand times a day. So essential is this food for the lungs, and the motions of the thorax in getting it, to life, that the suspension of one or the other for five minutes is equivalent to death. An instant contact of the inspired air with the air cells so weakens and pollutes it that it is driven out as unfit any longer to sustain life, and this, more than a thousand times an hour. To show that expired air is poisonous, it is only needful to put a mouse in a small air tight bottle, when soon the terrible mode of dying which destroyed 146 men in a single night in the Black Calcutta hole, will be seen. Under natural circumstances inspired air is therefore the breath of life, expired air the breath of death.

According to Prof. Parkes a man needs every hour 2,000 cubic feet of *new* air. How does, or how was it designed that he should get this? Let us see. Have you ever thought of the wonderful mobility of the atmosphere. Its great and leading law is motion. It either moves with the swiftness of a hurricane, or so gently that you can only detect it by the movements of hazy dust, illuminated in shadow by a sunbeam. It sweeps away the foulness generated on our streets and court-yards a thousand times a day; it carries off, and diffuses your breath of death into illimitable space: to be reconverted by the action of the sun upon the cells of vegetables into the breath of life. A very important and beneficent purpose is thus subserved by this law of never

ending motion; preserving man and beast from being enveloped in a halo of foul excretions always emanating from lungs and skin. Yet man has done, and is to-day doing his utmost to set this law at defiance. He builds himself houses, tight of joint, thick of wall, and as impervious to outside air as it is possible to make them. His object is to box up tight a few hundred cubic feet of air and live in it, the night and sometimes the day through. A leaky window frame or door crevice is an imperfection and must be remedied. Anything like a current of purity from without, anything like air motion in a house is a woman's abomination.

In this motionless air, men, women and children, immure themselves, often from morn till eve, and deem themselves and those they hold dear, fortunate in having the privilege of breathing and rebreathing this breath of death the entire night. Take the stupefaction of the olfactory nerve away by a walk in the pure crisp air of the morning, and then reenter the room where you have slept and waked, and its foulness will almost stagger endurance.

Indeed it is a prime object everywhere and among all classes of people, in houses private and public, in school-rooms, halls, churches, railroad coaches, to *imprison* a little air—heat it—and live in it. Little wonder that under such a system man should be sickly—little wonder that with the lungs half starved three fourths of the time, they should go into a decline, and perish by consumption. As physicians we are very careful that the stomach shall have an abundance of good pure food, but wholly overlook the needs of half starved lungs. We too often forget that every molecule of matter in the blood must have its molecule of oxygen, else it becomes not only useless but pernicious.

Children suffer more than adults by lung starvation. In proportion to their size they exhale more of the deleterious compounds, absorb more oxygen, and breathe from three to five thousand times oftener than adults in a twenty-four hour

period. Hence they suffer more quickly and acutely from lung starvation, and perish in immense numbers by convulsions, tubercular-meningitis, scarlet fever and cholera infantum.

The late Dr. Meredith Reese devoted much time to investigating the causes of infant mortality in cities; and the conclusion at which he arrived was that the rate furnished a true measure of air impurity in any given locality.

For the preservation of health the requirements of this law are imperative, just as imperative as that the air now momentarily in contact with the air cells of your lungs should be ejected, because deprived of some of its life giving properties, and charged with some that are death giving. To live and breathe in an air which is pure, its natural movements must not be arrested. To this end there must be ventilation; or a current of air in some definite direction. The mere agitation of that boxed up within impervious walls is not ventilation any more than the upward and downward motion of water in a stagnant pool by unequal heating, is not a current. Ventilation means running air, just as a brook means running water.

The foolish fear of air currents, with the body properly protected, is the worst possible for health. With the blood pure and strong, no one can take colds: with it impure and weak, no degree of care can prevent them; not even a hot house uniformity of temperature. And how can any one have pure blood by breathing impure air, how can the blood be warm and lively without oxygen, or clean and sweet unless the 600 million of cells in the lungs are washed out every instant with pure air? The lower animals when left to themselves always get pure—they do not rebreathe breathed air, and they scarcely, if ever, have colds or consumption. But subject them to human restraints, keep them in close houses, and stagnant air, and their colds and diseases become wonderfully like our own.

Some author has quaintly remarked that when men live in reed houses, they are as of oak, when they live in oak houses they are as of reed.

The idea of strength being gotten only through eating and drinking has become an overshadowing one. While the stomach of invalids is whipped up with stimulants and tonics, and loaded with the richest elements the earth affords, the needs of half starved lungs are wholly neglected. Such persons are usually kept closely in some boxed up stagnant air, not only necessarily impure but thin and weak by expansion. Putting the hand by the inside opening of the key hole in any ordinary constructed room makes one sensible that air is rushing in from without as if it had been exhausted by an air pump from within, near to the point of a vacuum. It is also seen that the air in the rooms of invalids is being eaten up and contaminated by gas lights, and that deadly carbonic oxide gas is exuding from the surface of a red hot furnace. The vitalizing influence of sunlight is also carefully excluded, and yet surprise is expressed that so much wine, iron and food does not ripen into strong red blood and firm toned muscle.

One thing more in regard to the air of houses in midwinter. As a rule it is kept far too warm; the difference between the temperature in a house and out of it, is far too great. Said an invalid to me not long since—I must leave this country—the climate is too changeable—I can not stand it. You may think so, was my reply, but you yourself create changes of climate which in suddenness and severity exceed all of nature's a hundred fold. How is that? On the inside of your house is the climate of the African desert, dry, hot and stifling, on the outside, that of Greenland, damp, cold and biting; and you pass from one to the other a dozen or more times every day in an instant of time. With proper ventilation in houses there would not be the climate of Cuba one moment and that of Canada the next, the proper course

for comfort and health being *to clothe the body more, and warm houses less.*

In these ways art not only serves to render air impure in houses, but it does much to affect the same out of them. Especially is this true of towns and cities. Upon a small area immense quantities of organic matter are collected, which in greater part must sooner or later pass into a state of offensive decomposition. With eyes and ears closed, and nostrils open, the homes of some families may be told by their odor; and no less is the same sense able to distinguish the air of a city from that of the country. The sense of smell by the way is not simply as some seem to think an organ for pleasure, or the reverse, but it is the outpost sentinel of danger to the lungs and blood. In delicacy and availability for sanitary purposes it is far superior to all chemical reagents.

There has been much written about the malaria of the country, though for one, I have never been able to find much evidence of the mal, or bad air about it, but a great deal of the mal about the air of towns and cities. We all mind it most "when the wind don't blow;" for then nature's great foul air scavenger is at rest. Decaying organic matter lines the streets, lies in heaps in alleys and court-yards, fills open vaults in the form of ordure, and pollutes the water of every gutter. Mingled with the effluvia from all these sources, is the foul air from thousands of chimneys, the foreign gases engendered in manufacturing, and the whiffs of abominable air from filthy abodes. Were it not for the wind which sweeps our streets by its almost uninterrupted motion, and the law of the diffusion of gases into each other, the malaria of cities would blast and wither life like a simoon.

With houses built so as to be swept by the wind on every side, lofty chimneys, wide and scrupulously clean streets and court-yards, the most improved sewerage, the removal of manufacturing from the vicinage of human abodes; in other words, with the sources of impure air on the outside of houses

corrected, and with pure air secured by thorough ventilation in every occupied room day and night, not only would the causes of colds, coughs and many fevers be destroyed, but the chief cause of the most fatal disease of civilized life, pulmonary consumption, would also be destroyed—a disease I unhesitatingly affirm arising in ninety per cent of cases by depriving the lungs and blood of that upon which they feed, and of which nature is so provident—an abundance of good pure air.

The second sanitary law to which I invite your attention is

ADEQUATE AND WHOLESOME FOOD AND DRINK.

If it should be asked whether mankind think more of living to eat than eating to live, the answer must be in favor of the former. Were it the object to eat in order to live, we would have little to do in the way of dyspepsia, and not many would be seen to die prematurely because of grossly abused digestive organs.

In this favored land ninety-nine die of over feeding, where one does from under feeding. Many of you, like myself, have never seen a case of disease and death arising from under feeding, but have seen hundreds from over feeding and worn out digestive organs.

Numerous are the arts to induce over eating. The most tempting products of nature are collected from every quarter of the globe, subjected, when possible, to some process which will render them yet more tempting, and placed on our tables in this *order:* the plainest and least savory first, the richest and most savory last. As soon as the appetite begins to pall upon the first course, a second, a third, a fourth, and even a fifth are appointed to succeed it, each more and more tempting so as to provoke and renew desire. In this way the sense of satiation is deceived and outwitted, and far more food partaken than if such arts had not been resorted

to. The results are that far more nutriment is taken into the blood than there is use for; the energies of the stomach, overstrained, soon fail, begetting dyspepsia and derangements of the liver and bowels. All the organs engaged in so much taking in and giving out of aliments being put to it day and night, are overworked, and become liable to torturing derangements, death beginning its work in and through them. To any one who thus overworks his digestive and excretory organs, never was better and pithier advice given than that of Abernethy to a rich and dyspeptic nobleman, "to earn a shilling a day and live on it." There seems to me good ground for the opinion that an undue importance is attached to nurturing the body through the stomach. There is scarcely a medical writer who, when treating upon the diseases of the poor does not refer to deficient alimentation as a most prolific cause. Because they are deprived of many of the luxuries of the rich, a hasty sympathetic judgment is apt to conclude that that must be a cause of their illness. But what are the evidences of underfed bodies? Are not lean and stunted physiques the most patient? And are not their opposites, or large and stout bodies accepted as conclusive of sufficient nourishment when the horse or the ox is seen in such state? Look at the physiques of the poor, foreign as well as domestic, and as a rule, are they not larger and stronger than those of the rich? It is on account of other habits and surroundings that the health of the pôor is often destroyed. The air they breathe is commonly very impure—their clothing insufficient, their habits irregular, vile and dissolute.

Relative inadequacy of food is more commonly a cause of disease, as, in a too great sameness in viands from meal to to meal and day to day. The lack of fresh vegetables all know generates scurvy, and with children the lack of earthy phospates, disease of the bones.

Considering the uses made of aliments by the animal

economy they may be divided into the carbonaceous and nitrogeneous, or the heat and tissue making foods. The inhabitants of the arctic regions require a large preponderance of the carbonaceous, and those of the tropical regions a large preponderance of the nitrogeneous. Capt. Hall resided for several years among the Esquimaux, and during the entire time had excellent health, which he attributed to eating raw blubber after the style of the natives, and sipping oil in lieu of tea or coffee. On the other hand in tropical regions rice, fresh vegetables, lean beef and acid fruits are what the natives subsist upon; and are besides, what experience has shown best conduces to the health of those who migrate to the torrid from the temperate zones.

Now, we of the temperate zone have some polar and some tropical experiences each year; which, upon the theory of the uses to which foods are put in the body must require unequal portions of the carbonaceous and nitrogeneous. Is this fact recognized and acted upon in its sanitary bearings? Do we eat in winter more of the carbonaceous and less of the nitrogeneous than in summer? I opine the custom and habit rule the conduct in this matter far more than craving or science. So long as this is the case will there be so much of what is called billiousness, and the necessity each spring for carthartics to thin the dark and rich blood of winter, and thus prepare it for the season of fervid heat.

In reference to the wholesomeness of foods I shall no doubt be considered at variance with prevailing views. During the vernal season immature vegetables so far from being injurious are really necessary and wholesome. Observe how nature prepares the animal kind for the heats of summer. Then their nourishment is weak, laxative and watery, just as, on the other hand, in autumn, it is rich, strong and fattening. But man thinks he knows better, and must eat as much bacon, lard, butter, etc., in spring and summer as

in winter, despite all the unheeded cravings—the mute appeals of nature, for something immature, green or sour.

Then again, wholesomeness and palatability are too often confounded. If some article of food is well cooked it is wholesome, if ill cooked, unwholesome. Now, the true purpose of cooking is to commence the process of digestion, coagulating the albumen, transforming starch into dextrine and rendering food granules more tender and susceptible to a speedy action of the gastric juice. Undue refinements, by grinding, sifting, boiling, clarifying and condensing—though they may render food more palatable, increase the labor of digestion—the process of reducing fruits by prolonged boiling with sugar, to preserves, or into marmalades or butters, renders them very savory, and serves to make them keep well *out* of the stomach, as well as to keep well in it. A certain degree of naturalness in food is essential to proper alimentation and to easy and quick digestion. Take in illustration our artful mode of managing the wheat kernel. The grinding is well enough, it saves labor for the jaws and teeth, but to separate the ingredients into a fine and palatable part, and into a coarser and more unpalatable part,—the latter to be rejected and thrown before swine, is at least to say, that the most perfect form of food for man is after all very imperfect. But experience has shown nature's wisdom and man's ignorance, for by rejecting the outer shell with its layer of phosphates three important objects which contribute to the welfare of the body are lost. 1st. For easy and quick digestion a certain degree of coarseness in foods is essential. Flour, of an impalpable fineness can not readily be penetrated by the gastric juice. The pharmaceutist is aware that in extracting the medical virtues of substances by alcohol—one of the most penetrating of liquids—fine powdering impedes, instead of facilitates the process. So it is with foods made any finer than what the molars are capable of effecting. 2d. By casting aside the branny covering with its shell of phosphates, the

growing bones of the young, and the brain, hair and skin are often deprived of adequate nourishment, producing disease or deformity in some form. When reason or custom thus misleads, an underlying instinct sometimes directs, as in the invincible desire now and then seen among the young to eat lime or clay. 3d. By separating all the coarse bran from the fine flour,—the residuum after digestion is so small and compact that the bowel does not receive its needful stimulus, and so becomes torpid in its excretions, and sugglish in its movements. Costiveness, headaches, and piles are the common results. The habitual use of Graham biscuit, brown bread, or cracked wheat, has according to my observation done more for habitual constipation than all the vaunted remedies of the materia medica.

In no one thing is the difference between civilization and barbarism more marked than in the management of foods. The barbarian takes his meat and drink very much as it is prepared for him by nature; the man of culture as modified in a thousand ways by art. And this art is commonly directed to a single object: the ministration to the sense of deliciousness. The object at our tables is not so much to eat what will meet the needs of the body, but what will give the greatest amount of piquant enjoyment, thus caring more for the means than the end. Not a little of our civilization is thus pure sensualism, or practical epicurianism, theoretically detested and denied. The consequences are that we are almost a nation of dyspeptics; while our savage neighbors either too ignorant or indolent to seek after our keen palatine pleasures, or content with nature's delicacies, hardly know what indigestion is. In body and limb they are splendid examples of physical development, they need not, as we do annually, millions of gallons of bitters for the stomach, and an army of dentists to keep their teeth in order.

No one with a bad digestion can long preserve good teeth. A furred tongue, and bad taste each morning, are sure

indications of depraved secretion and nutrition in the mouth; and is it to be expected that teeth nurtured amid disease, and bathed with unhealthy secretions can long retain their beauty and life?

The sanitary rule of drinks is a simple one—pure water. How to obtain this are more questions of will and engineering skill than of hygienic import. A popular fallacy, one that even prevails to some extent in medical ranks, is that because the drinking of impure water seldom produces *immediate* disease that it is not therefore very harmful. A like notion prevails by the way, in reference to breathing impure air, eating unwholesome food, the use of tobacco and moderate indulgence in ardent spirits. Some do one or the others for years, and yet have no serious illness. But the same may be said of opium and arsenic eating, or in fact of any deleterious habit. The gourmand, the masturbator, the tight lacer, the sedentary, the one with brain or body overworked, and the most uncleanly person may live so for years without active disease; though this by no means proves that no harm is resulting, or will result.

When disease shall appear depends upon the intensity of the cause and the resisting power of the constitution. An intense application of any of these causes no one can long resist, but the strong longer than the weak. In this everything depends upon inheritance; if a strong constitution like a rich patrimony is inherited, reckless dissipation will bring about, only more slowly the bankrupt condition. The poor in constitution, like the poor in purse, become bankrupt in a year or two; the rich in constitution or purse can run much longer. But reach a time all such certainly will, when there will be no more to spend, and for the rest of their days they will lament their folly, and eat in barren repentance the bitter fruits they have sown. The young and vigorous in answer to remonstrances about imprudent eating or drinking gaily say such things do

not hurt them. Wait and see. In a few years when they ought to be in their prime, what do we behold but poor, pallid, lank, complaining, miserable wrecks, and yet dissipation did them no harm! They realize the force of the old adage "that every man is either a fool or a physician at forty;" and become wise only when it is too late to save.

It may be laid down as a law, that infringements not punished at one end of life are sure to be at the other. The organs most abused are the ones through which disease and death enter the body; and the history of a man's life may be usually read through his mode of dying.

As medical men the bearings of stimulating drinks upon health need more definite settlement. The moderate use of such beverages, it is alleged by not a few authorities is not inimical so health. And the diligence with which some apologize for their use, or seek after some important object they are capable of accomplishing in the animal economy, leads one to suspect that they are not unbiased in their judgment by the gustatory sense.

It is claimed for spirituous drinks that they serve to arrest retrograde metamorphosis, but in health *cui bono!* Is not cell metamorphosis the ultimate process we are able to perceive, upon which life itself depends. Arrest cell change, and death results, make it a little slower or faster than the physiological standard and disease ensues. What then is the advantage save under exceptional circumstances of interfering with it with alcohol. If it is an efficient and economical retarder of waste in the body, surely the farmer ought to avail himself of it in fattening his stock. But it has been experimentally determined that after the influence of alcohol upon cell change passes off metamorphosis is just as much accelerated as it was previously retarded. Where then is the gain, and what good can arise by interfering in this way with physiological change?

The opinion once entertained that alcohol furnishes fuel

for the heat making process in the body, has been shown to be erroneous. It is expelled from the body as alcohol, its elements unused and unuseable. The glow of heat which succeeds imbibition is not, as the thermometer has demonstrated, due to an increase of temperature, but is probably produced by the benumbing, tingling quality of the alcoholic poison upon the nerves. As Dr. Parks remarks the testimony of arctic explorers is singularly unanimous that alcohol notably diminishes the power of the body to endure intense cold.

The testimony of British army surgeons—among whom I may mention Inspector General Sir John Hall—and of American surgeons, to be found in the Sanitary Memoirs of the rebellion, are against the use of spirits by the soldiers as a health promoting measure. Indeed it is difficult to understand upon what principle or law the health of the healthy can be preserved by imbibing a poison. Its use when there is disorder, or the elements of death at work in the system is another matter.

That alcohol is a poison there can be no well grounded doubt. The degeneration of tissue to which it gives rise, the hob nail liver, and the tremor with delirium are sufficient evidences. There would be no difficulty in gaining assent to this, were the primary effects of alcoholic drinks not so agreeable. Even the secondary effects, the nausea, vomiting and headache so commonly following inebriation, would be deemed sufficient evidence of poisoning had they arisen from drinking some particular kind of water, or some not very agreeable substance.

An erroneous notion, widely disseminated, is that the greater prevalence of delirium tremens now, than during a period yet within the memory of the living, arises from the great extent to which it is alleged the adulteration of liquors is carried. The fact is apparently forgotten that no poison save alcohol is capable of giving rise to this particular form of disease; as well as, that in the rural districts the disease is

perhaps as rare as it ever was. I ask you, who have practised among intemperate farmers, if the disease is not exceedingly uncommon. The ability of the country man to resist alcoholic poisoning better than the townsman comes from his otherwise better habits—the pure air he breathes, the out-door exercise, and his superior stamina of constitution.

All the poisons to which mankind have become addicted have one effect strikingly characteristic. The use of water for twenty years does not increase the craving for it, nor does the taste grow by use for a peach, an orange or a lemon. But those addicted to tobacco, to spirituous drinks, to arsenic, to opium, to hasheesh, find that the desire for them increases in intensity; leading to greater and greater excesses until the will and judgment are wholly subjugated. The same is true though to a minor degree, of tea and coffee; their worst tendencies however being in producing that state of the nervous system which renders the enticements of stronger stimulants, a part of our ntaure. What stronger evidence could we ask, that the use of such substances is unnatural and deleterious, leading those who yield to temptation on to their own destruction.

The third sanitary law is,

ADEQUATE OUT-DOOR EXERCISE.

The stock breeder in raising young kine and horses is very careful they shall have the freedom of the field, and perform very little forced labor of any kind, until their growth is complete. He is very well aware that much confinement renders them tender and liable to disease, that much labor stunts their growth, spirit, symmetry and perfection of development. It is a proper subject for lament that the application of a little of the like common sense is not made by humans in raising their young.

A child, as soon as it begins to walk, has an instinctive and almost uncontrollable desire for free out door activity. It is upon this that our vaunted system of "training a child

in the way it should go," is first expended. There is thought to be something bad in the restless, fidgety, noisy, whooping boy and girl. They must be taught to be quiet, to stay in the house, and behave like some quiet demure old woman. The model child is a quiet child, an old-acting young child. To this standard fathers and mothers strive to bring their children. The noisy, rollicking boy is the horror of nervous women, and the romping, loud laughing girl is considered exceedingly rude and ill behaved. The repression of childish playfulness, which a mother can not accomplish at home, is attained in the school room, and this is often a motive for sending noisy boys and girls under the dominion of the teacher. The usual physical effects are soon displayed. The diminishing appetite, the paling cheek, the thinning flesh, the frequent headache, and the marked falling away of spirit or liveliness is regarded as evidence of taming down, but which tell a tale of cruel and injurious restraint, and which in the young of domestic animals would create solicitude as to their thrift, health and growth.

The strong yearning of the young for an active out door life has a most beneficent purpose—the making of vigorous, symmetrical and healthful bodies. The venerable Erasmus Wilson wrote, "Youth, it can not be too often repeated, is the time for storing strength, both physical and moral, and every act which can in any way impede or frustrate this all-wise-intention of nature will tend to lay the foundation of a weak and imperfect body, and shorten the days of its possessor."

The significance of the falling away of health, strength and vigor are quite different in youth from what they are in adult life. In such cases in youth, there is not only an arrest of the strong process, but a using up of a slender stock on hand, there is a going backward at the only time that a going forward is possible; while in adult life there is no

arrest of development, there is no arrest of accumulation, but a simple using up of that on hand.

The disregard of this requirement for the best physical development, works out an amount of suffering for the human family beyond computation. Trained up so as to make bodies frail and tender, and nerves large and susceptible. every rude breeze chills, every touch bruises; and, with women especially, life is made up of moments of exciting pleasure, and hours of depressing misery. Women can be found by the thousand who have not had perfect health during an entire week for a score of years. In large part is this produced by their hot-house indolent habits, by faulty training during their expanding years. The forced and prolonged quietude of the school room, and the repression of playfulness by vain and shortsighted mothers, lie at the foundation of the evil. The protracted deadening inaction of our school system; its exclusive straining attention to brain, and total disregard of bone, muscle, blood and lung, urgently need reform.

The benefit from mental training does not depend upon the time devoted to it, nor upon the perfection of muscular inaction, but upon the intensity of the attention. And how can this be obtained with back and limbs aching by long continued constraint. Not one of you could think connectedly or deeply under such circumstances, and how much less should it be expected of restless boys and girls, whose inherent desire for motion and intolerance of confinement is so much greater? The stupid fashionable vanity of compelling children to sit like statues, in long continued unbending uprightness causes the vertebræ to ache, to inflame and finally to ulcerate from the steady weight and severity of the pressure on each other. Examine the poor beast that drags the canal boat, and its shoulders will be found either to be raw, or scarred with what has been rawness. The cause of this more than with other kinds of draft, arises from the steadiness

of the pressure upon the shoulders. So is it with the steadiness of the pressure upon the bones of the spinal column in children of the school-room—whose bones are as yet imperfectly developed; resulting in crooked spines and deformity for life. But, it is not alone in undue action of the body in the school-room that disorders arise, over action of the brain is also prolific in diseases. The latest devoloping organ, the brain is forced forward, the earliest developing part, muscular activity, is forced backward. The nutrition which should be expended in material brain growth, is spent under a task master in forced mental work, producing childish precocity and adult inanity. A compromise must be effected between the requirements of the physical and mental systems if we wish to have anything like healthful, strong and long-lived men and women.

For the preservation of the health and strength in adult life, out-door exercise is only second in importance to what it is during the period of growth. The organization of our social system unfortunately tends to prevent this. One class of men may be said to do all the thinking, another all the acting; one gets overmuch muscular labor, the other too little. The one is pale in blood, thin in flesh, turgid in brain, quick in nerve; the other is ruddy, muscular, cumbrous in bone and point, slow and dull in brain. The farmer inured to severe out-door labor from childhood up, seems a marvel of ponderous strength, yet the showing is mainly on the exterior, and is often as striking as it is deceptive. The interior organs—the evolvers of the force, having been put to it all their days to make up for waste on the outside, do not possess an abundance of reserve energy. After a hard day's toil these interior parts often throb with excitement by their efforts to supply the waste from without. The digestion of a full supper is frequently from this cause impossible, and every attempt at deep and connected thought is futile. It is otherwise with young men raised in towns and cities. With

them there has not been a monopoly of energy for the exterior; these organs of generative force have had time and opportunity to gain in growth and power. Thus it is, that the son of toil does not have interior organs of production adequate to his exterior organs of expenditure—while with those of towns, who have not toiled wearily all their days from morn till eve, the ratio is just the other way. From this cause during the late rebellion, to the surprise of many, the soldiers from towns and cities displayed—if I may be permitted the use of the turf phrase—more *bottom* than those from the rural districts.

The lack of sufficient out-door exercise among American women is perhaps the most influential condition which has rendered them unusually tender and frail, and their beauty so short-lived as to have made it proverbial. Secluded in warm, close, darkened rooms, nine-tenths of their days, and nourished on rich and concentrated viands, they bloom in early spring, and wither and die in what ought to be the summer of their lives. The plant always in a calm, and in a hot-house uniformity of temperature, and the plant always in a storm, are not normal productions. The one is rough, angular, scarred and scraggy, the other is over soft and fragile. How easy the latter is to bruise, how tender to every rude touch, how susceptible to chilling winds, how soon it blooms, withers and dies. Just so is it with American women. The maid of one year is with difficulty recognized in the mother of the next, and for a single year of pleasure or of a forced untimely beauty, they have a dozen of withered repulsiveness. This premature breaking down and chronic ill health has been popularly attributed to the climate, true to the acquired bend of the mind to lay the blame for our ailments on anything or everything save ourselves. To vivify the blood and cause it to tingle in the nerves with exuberant life; to knit the flowing globules into firm muscle, bestowing not only a lasting and charming

contour, but vigor and elastic grace to every movement, daily exercise and exposure to the shining sunlight and pure air are indispensible.

English ladies of rank understand this, and think nothing of walking their four or five miles a day, while our ladies in town and country would think such a thing "perfectly dreadful!"

The fourth law is,

ADEQUATE AND UNCONSTRAINING COVERING FOR THE BODY.

The relation of clothing to health is confined to four points: 1st. Its sufficiency. 2d. Uniformity. 3d. Ease and Lightness, and 4th. Unconstraint.

A useful lesson may be learnt from nature as to the proper mode of covering for the body. Take that of the horse as a familiar illustration. It is light, easy and uniform over all parts. In spring and summer it is light and thin, and in winter thick and shaggy. When the weather is warm the hairy covering lies flat and limp, when cold it is erect and furry; the precise states affording the least and the greatest protection from cold. The body is not thickly covered one hour and uncovered the next, it is not cramped by tight covering at one point, while at another it stands away from the body from two to twenty inches; nor are the neck and shoulders ever bared while the waist and loins have a triple thickness.

In reference to the sufficiency of clothing no absolute rule is enjoinable. Individual sensation is undoubtedly the best guide—though this, as all know, is very much under the control of habit. With plenty of wholesome food and pure air the slighter sensations of cold are not productive of disease. Like the feeling of hunger it is natural and harmless, but to feel cold all the time, like feeling hungry all the time, clearly denotes inadequateness. The habit of clothing in-

fants and children thinly with the view of hardening them is a pernicious one. At this period of life the system is tender and capable of but small resistance; while a constant drain of heat from within stunts the growth, and hinders the development of that strong vitality, which in manhood rises superior to all external changes.

Notwithstanding the importance of uniform covering for the body, it is systematically disregarded. Pride and a slavish subservience to fashion require that parts of the body warmly clad at home, are to be thinly clad, or even bared on the street, or at a social gathering, without any reference to external temperature. Even the superior hardiness of the beasts of the field could not long withstand such artful habits and exposure. Parts habitually open to cold like the face and hands acquire, through increased vascularity, superior resisting power, just as parts subjected to unusual friction or great pressure, acquire, through a horny hardness, superior resisting power—and to apply cold like friction or pressure, to tender and bare parts, will be followed by disordered results.

Lightness and ease of clothing for the body are not minor matters. All of nature's models in which a high degree of protection is requisite, are of this character. The fur of the beaver, the down of the Orkney duck, combine in a remarkable degree lightness, ease and warmth. Man has not even creditably imitated, much less excelled, nature in this matter; but in making his fabrics for warmth strives to make them as firm, close, smooth, or highly dressed as possible; than which a more effectual mode to diminish their protective quality could not be adopted. Observe the domestic fowl taking to its perch during the most intense cold of winter, and instead of drawing human like its protective covering close to the body, it shakes its feathers out loose or erect from the body. Long, fine, loose, and thick fibres are the true models for warmth, and in manufacturing garments for

protection, instead of carefully removing the nap, the great care should be to preserve and increase it. Three pounds of wool thus wrought into a garment, would be far more protective than ten made into hard, firm, smoothly dressed cloth. The weakly would not then be borne down by the weight of dense, heat-conducting clothes, and they would not be in a shiver three-fourths of the time; for it ought to be remembered that the ability to carry a great mass of clothing is usually in an inverse ratio to the necessity for it. Clothing which constrains the natural movements, or impedes the flow of blood, is a frequent source of disease. Tight, badly fitting boots or shoes, by impeding the flow of blood, and bringing severe pressure on a few points of the foot, developes, as is well known, those painful and deforming excrescences, corns and bunions. Tight, unyielding hat bands in the same way hinder the flow of blood in the pericranium, and so on all the parts above the band—with the assistance of confined and overheated air, destroys its beauty and life.

But the worst form of constraint to natural movements comes of tight lacing. There, the parts involved are essential to vitality, and in addition to suffering, there is a serious interference with the fundamentals of organic life. Tight stays, by hindering the motions of the lower ribs, and obstructing the circulation in the walls of the thorax, cause atrophy and weakness in some of the respiratory and spinal muscles, and often to such a degree that women when without this artificial support, feel their weakness so greatly that they are perfectly miserable. Still more important is the interference with the motions of the stomach, the expansion of the thorax and the impaired circulation and nutrition of the liver and adjacent organs. The action of the heart is sometimes temporarily overcome, as in fainting, the lower edges of the lungs gorge, the stomach emits croaking sounds, the nose purples, the bowels are pressed downwards, the womb falls,

and sangufying is imperfectly performed. Following these immediate effects are others more remote. While abounding in youthful energy and elastic vigor—internal organs are not apt to become fatally deranged by this vicious custom. Still their nutrition and strength are impaired; and as soon as there is a drain of strength from any other cause, as by maternity, or by advancing years, disease of the impaired organ is almost certain to become manifest. From this cause very many women decline and die after the first child-birth. The organs whose function it is to elaborate blood being scarcely equal to the requirements of one life, succumb when required to elaborate plastic matter for two. Hence, women who have long been tight lacers are either exceedingly thin, weak and wan, unable to walk a furlong at a time, or some intractible disease seizes the maltreated organs, hurrying many mothers into untimely graves. Did the evil cease with themselves, ignoring of such conduct would not be so dark and damning. Bringing children into the world, feeble in frame aud weak in constitution, is a terrible evil. That such is a result of tight lacing it is only needful to recall the fact that the organs which suffer by the constraint are those engaged in the elaboration of blood. Enfeeble or impair this process, and how can the mother elaborate an abundance of excellent blood wherewith to nurture into a strong life the embryotic germ. It stands us in hand even as physicians to remember Sir Wm. Hamilton's sage remark that "constitutions are not made, they grow;" they grow by and through the quality of the life in the parent cells, and the quality of blood furnished by the mother.

The sanitary law next in order is,

THE EXERCISE OF THE SEXUAL FUNCTION ONLY FOR, AND NO INTERFERENCE WITH THE NORMAL FUNCTION OF REPRODUCTION.

Between man and the beast of the field there is this striking difference, the latter attains its highest good through the

direct insight of instinct—a quality which seldom errs, and is non-progressive, while man can only attain his through reason—a quality very liable to err, and eminently progressive. An animal's nature is a law unto self, it cannot do otherwise than conform to it, while man's nature is not a law unto itself, and he *can act* in consonance or dissonance to ascertained law. Hence, as Bushnell maintains, man is truly a supernatural being, obeying or disobeying natural law as to him seemeth best. But while he has this freedom, he is also aware that in this very freedom is contained the measure of his responsibilitiy. The reasoning faculty informs him that if he does certain things, evil results, and if he does certain other things, good results; so that in a moral point of view, though he has the power he has not the right.

These differences, the manner and results of certain courses of conduct, are well illustrated by the reproductive act. Were it not for the pleasure attending co-habitation, the earth would soon become an uninhabited globe. The reproduction of species is forever insured by the powerful attraction of sensual impulse. Animals cannot disobey it, neither can they deviate from the periodical times for its exercise; they never co-habit when reproduction is impossible, neither can they evade the end in the use of the means; in short, with them pleasure and reproduction or the means and the end are inseparable. With man it is different; he can, and he does separate the means from the end; he can and he does co-habit when reproduction is impossible, he does evade the end, and he practices sexuality when he pleases, pleasure not reproduction being the great end in view. Perhaps some may think this one of the prerogatives of rational beings, a privilege vouchsafed to the possessors of a God-like nature. I shrink from considering such a desecrating view of the objects of our superior nature, much less to think the High Ruler ever designed our greater light to show us the

way to depths of carnality of which the lower animals are happily incapable. What would *we* think of any species of the inferior animals which seemed to live only to practice sexual intercourse to the full limit of their ability without the possibility of reproduction; and practiced it through the entire period of pregnancy, bringing forth their young loathsomely diseased? Would we not execrate and exterminate such foul creatures from the face of the earth? And, if this would be the effect of such a disgusting exhibition of sensuality in the lower animals, what ought it to be considered in him who was made in the image of his Creator? Let its practicers and defenders answer.

The accumulated experience of centuries conclusively shows that whenever man converts what was designed as a means into an end, harm or evil ensues. We have already seen that this is the result of our studied efforts to turn palative pleasures into ends, instead of the simple means of existence. The same is true of the misuse of the procreative organs. Solitary indulgence, of course, precludes anything like reproduction, and its evil results are too well known to need enumeration. Then excessive and promiscuous intercourse without the possibility of reproduction is extremly fruitful in disease. Mankind are the only beings that have the unhappy distinction of being scourged by a host of sexual disorders. Even attempts of curious students to propagate the syphilitic virus among the inferior animals have failed. The only violator is with propriety the only sufferer. Dysmenorrhea, amenorrhea, menorragia, leucorrhea, and malpositions of the generative organs are in the female of very common occurrence. Bumstead is of opinion that by excessive venery and other debilitating causes gonorrhea may originate independent of contagion and among women strictly virtuous. When the behavior of the animal male and female to each other during impregnation is compared with that of humans, it is enough to make us blush

for our kind. What we in derision misname an animal propensity we practice to an extent unknown to them. The male animal seldom insults the female during pregnancy, and when he does, the latter defends herself with ferocious zeal. It is for man to outdo the animal in animal indulgences, to out-Herod Herod, and prostitute the body to the single service of sensuality. All classes and conditions in society practice this thing, even those who are so unmerciful and free in their denunciation of promiscuous prostitution. Coition for any other purpose than reproduction, or with the design of evading it, or at such times when it is impossible, is prostitution, no matter whether committed within or without the ban of marriage. It is for the medical profession to teach in this thing a higher and purer conduct, a higher and purer morality.

There may be and often is doubt upon laws claiming to be divinely promulgated, whether they are so or not, but concerning the origin of the law of means to ends, and of the evil results which ensue when infringed, there can be no doubt. The stigma of disorder or disease is but the handwriting of an occult and just power for laws infringed, their judgments silent and self-executing.

Coition during impregnation is a frequent cause of abortion and leucorrhea. Upon the offspring, especially in mothers of a nervous temperament, it is fraught with evil. It tends to give the child a stupid, animalized expression, and predisposes to convulsions and that terrible disease, worse than death, epilepsy. Excessive venery will produce epilepsy in the adult,—and is it to be presumed that the tender and susceptible embryo can escape such a tendency, such a predisposition, when every quality it possesses grows from those of its parents?

For the only creatures capable of infringing this law there is the terrible distinction of affliction by syphilis. You will agree with me that this is the most horrible disease with

which we are acquainted, pervading every globule of infected blood, almost irradicable, and descending through, with mitigated infamy and corruption, to offspring. Innocent children carry with them through life the brand of the disease in a peculiar formation of the front teeth, and are besides possessed of a taint that dooms them to derangement from the slightest causes to more or less suffering, disease or deformity, with the chances of being cut off in early life.

Not content with the largest indulgence of the sexual passion solely for the pleasure afforded, or with the design of avoiding its consecrated end, man with wicked purpose lays violent hands upon the results of sexual union. We are all well aware, not only by frequent applications for, but by the fearful results which often arise from abortions, that the wilful destruction of fetal life is far greater than is commonly supposed. It exceeds all other forms of murder at least seventy per cent., and with the destruction of fetal life there is every now and then that of the mother. Ovid long ago sung of the latter:

> "But righteous vengeance oft their crimes pursues,
> And they are lost themselves who would their children lose;
> The poisonous drugs with mortal juices fill
> Their veins, and undesigned themselves they kill,
> Themselves upon the bier are breathless borne,
> With hair tied up which was in ringlets worn."

Thanks to the out-spoken condemnation of criminal abortions by the best of our profession, its commission can rarely be laid at our door. To Dr. Storer and the American Medical Association is due the credit of a popular awakening upon this subject. The title of his essay, "Why Not?" aptly expresses the usual response of married women to the remonstrances of the physician against its performance. And, truth to tell, these remonstrances are usually of no avail, for when a woman once gets her mind down to the idea of being rid of her unborn offspring it is usually found

that where there is a will there is a way. They even learn, as you all know, to perform the operation on themselves or on each other, else through some patent nostrum, advertised with the significant caution not to be used during pregnancy, or else they procure the services of some low-bred well-known charlatan who adopts the destruction of fetal life as his speciality. The untoward influence of abortions upon health are too well known to need elaboration. When life is not immediately destroyed, the shock is often such that it is never fully overcome. Doubtless every one of you knows of one or more subjects of this violence who have not, since its date, seen a well day. Especially are the organs of reproduction liable to suffer; either the uterus or its neck remains in an abnormal state, and, as Dr. Storer remarks, toward the decline of life those who have suffered from abortions are more liable than other women to that terrible disease, cancer of the womb.

The sanitary law next in order is

A HABITATION IN THE CLIMATE FOR WHICH THE CONSTITUTION OF THE BODY IS ADAPTED.

It is a popular notion that mankind are by nature cosmopolitans. Taken as a race, they unquestionably are so; take them in species, and they are as much bound to a region as are the beasts of the field. Were it not for the artificial protection which they are capable of employing, the parallel would be perfect. Take a man or an animal, native of some tropical region of the earth, to England or the northern States of America, and under like circumstances one will not survive much longer than the other. Dr. Copland states that the negro suddenly transported to England seldom lives two winters in it. On the other hand, Dr. Boudin testifies of the French in Algeria that they would soon become extinct but for emigration. The same is true of the English in Bengal and the Antilles. Says Dr. Aitken, "When an

Englishman is placed in the most beautiful part of Bengal or Jamaica, where malaria does not exist, although he may be subject to no attack of acute disease, but may live with a tolerable degree of health his three-score years and ten, he nevertheless ceases to be the same healthy individual he once was, and moreover, his descendants degenerate. He complains bitterly of the heat, his plump, plethoric frame becomes attenuated, his blood loses fibrine and red globules, both mind and body become sluggish, gray hairs and other marks show that age has come on prematurely, the man of forty looks fifty years old, the average duration of life is shortened (as shown in life insurance tables), and the race in time would be exterminated if cut off from fresh supplies of emigrants from the home country. The European in the Antilles struggles with existence, a prey to fever and dysentery. He is unequal to all labor, becomes wasted and wan, and finally perishes. . . Our army historians tell us that our troops do not become acclimated in India. Length of residence in a distant land affords no immunity from the diseases of its climate. A thousand strong men form this year a regiment; a year passes, and one hundred and twenty-five new recruits are required to fill up the broken column, and eight years have come and gone, and not a man of the original thousand remains in the dissolving corps." The oldest regiment in India, the Bombay tufts, stationed there since the time of Charles I, has never been able, although marriages are encouraged, to raise boys enough to supply the regiment with drummers and fifers. In the face of such facts, of which many others equally explicit might be adduced, is it not clear that a removal to a distant climate for which the constitution of the body is not adapted, is an infringement of the conditions for perfect health?

A change of climate is often a therapeutical agent of great power. The inroads of disease frequently throw the system, so to speak, out of tune with the conditions amid which it is

placed, and a change is beneficial when it tends to restore the lost harmony. But, like all other therapeutical agents, what serves to restore the health of the sickly also destroys the health of the healthy, far more being affected in the latter than in the former way. The most influential agent of climatic conditions is heat. The relative degree of humidity, altitude, winds, and electric disturbances also have important powers over physiological action. The conditions favorable to health and life of the indigines of the poles or the north temperate zones are destructive to the indigines of the tropical, and *vice versa*. The struggle between the two does not extend beyond the third generation, the end not being in adaptation but in extermination. Now, such being the result of extreme climatic changes upon the healthy, the question arises, what is the result of changes less extreme? As the struggle is not decided by extermination, it is reasonable to suppose that it may on that account be more protracted, there being less inequality between the constructive and destructive conditions. This lack of adaptation is, in my opinion, the real cause of some diseases usually attributed to malaria, or, in other terms, they are due to our malposition in climate, and not to malaria. It does not harmonize with our knowledge of nature's operations to aver that the unfitness of external conditions to human health arises from the fault of nature. It is a well-known fact that animal and vegetable life, not interfered with by art, are almost free from disorders and disease, and that in proportion as they are put by men amid abnormal conditions do they become sickly. It is wholly owing to these artful conditions that infections and contagious diseases are originated among animals, spreading among them, under favorable circumstances, far and wide. The transposition of vegetable forms to zones for which they are not adapted is, as all know, a very common cause of sickly life in them. The mildew which attacks the English gooseberry, the rust on wheat, and the short,

sickly life of many ornamental shrubs, far removed from their native habitats, are recognized as arising from transposition to soils and climates not adapted to their healthy life. It is not assumed that nature generates a special poison destructive to their growth, thrift, and life, as it is with reference to some of the diseases which attack man. Were the causes which prove so fatal to the intertropical inhabitant when suddenly deputed to the climate of England only *localized*, there would be precisely the same grounds for believing the cause to be a malaria, as there is for supposing the cause to be a malaria which proves so fatal to the indigines of the extreme temperate when removed to an intertropical region. And, when we examine the local conditions which prove so fatal to the northern emigrant, it is found that as we approach the tropics there are local climatic conditions not found in more temperate regions. For example, the remarkable diurnal variations of heat often reaching 30°, and occurring almost every diurnal period, are never found north of 45th parallel. Nor is this local climatic peculiarity limited to its heat range; from the same cause there are great variations in atmospheric humidity, relatively dry during the heat of the day, damp and foggy during the chills of the night; and so certain forms of animal and vegetable life can maintain in such places, or in rice swamps and jungles, healthful, protracted lives. So only certain races of the human kind can live in such localities and maintain healthful, protracted lives. The insalubrious conditions are precisely the same in each case, a lack of adaptation by living amid them through a period which spans many generations. To be sure, the effects of such malpositions are very different in vegetable and lower animal life from what they are in human life. But are not the more complicated effects on the latter easily explicable by their more complicated organization and modes of living? The pith of the argument, then, is simply this: that by a removal to a climate where the

change is most extreme, a succession of disorders and speedy extermination are the results, and by removals to climates where the change is less, the struggle to maintain health and life in a natural manner is less severe and more protracted; and that some diseases, such as those ordinarily attributed to malaria, really arise from this cause or from conditions to the indigines perfectly normal, to the foreigner abnormal.

The next sanitary law is:

PURSUITS WHICH DO NOT CRAMP OR OVERSTRAIN ANY PART OF THE BODY, OR SUBJECT IT TO THE ACTION OF IRRITATING OR POISONOUS SUBSTANCES.

I cannot here enter into details on all the ways in which this law is infringed. The principles which underlie the matter I shall endeavor to set forth in a very summary manner. The increased subdivision of pursuits in recent days, while it contributes to excellence in results, undoubtedly tends to the production of disease. The special education of one sense, or of one class of muscles, necessarily implies disuse of the others. Now, we all know that training and use, to be normal, must be diversified. We see men with large hands and arms, and thin, spindling legs; we see men with large, ruddy, lithe bodies, and men with small, pale, and languid ones; in each there was cause, for development is not a thing of chance or of accident. The tailor and the shoemaker, by their inactive indoor pursuits and cramping position, interfere with the action of the organs which elaborate blood, and hence as a class are thin, pale, or tinted with a bilious hue. On the other hand, public speakers and actors strain the vocal organs, heart, and blood circulation, gymnasts the muscles, literati the brain; such exclusiveness in action of particular parts leading to disuse, atrophy, and hebetude of other parts. In this way the harmony, inherent strength, and symmetrical development of the body as a whole are subverted, causing one part to fail and die before

other parts, and so produce all the throes and agony of a violent, untimely death, or the death by disease.

Concerning the injurious effects of irritating and poisonous substances, I need not detain you, all being aware that stone-cutters, steel grinders, and workmen in lead, copper, and mercury are exceedingly liable to be carried off with diseases appropriate to their occupations.

On the eighth law of sanitation, *personal cleanliness*, the requirements are so obvious and well understood, and, having nothing to say that has not already often been said, I may properly pass to the ninth law, or

TRANQUIL STATES OF THE MIND AND ADEQUATE REST AND SLEEP.

That intellection and emotion have very important influences over the welfare of the body all students of medical science are well aware. Still it amounts in very many instances more to a theoretical recognition than a practical maxim. The correlations of the physical and mental forces are, it seems to me, not sufficiently appreciated. Without going as far as Vogt, who maintains that the brain secretes thought as the liver does bile, there are no clearly settled facts which contravene the doctrine that long continued and intense mental action drains the system at large of its energies, this not unfrequently to such an extent as to interfere with the proper performance of the functions in other parts. Not only may there be an arrest of secretion, as in the stomach, but the secretion itself may by intense emotion be greatly depraved, as in the mammary gland, and act like a poison upon the nursing child.

An over eager intensity in pursuit is, as travelers tell us, an American characteristic. Especially is this true of the residents of cities where rivalry and ambition stimulate exertion to a most intense degree. A severely worked nervous system tends to bring on various nervous derangements, to

wear out that part prematurely, and to diminish the tone and size of the organs devoted to nutrition and locomotion. We may attempt to fire up flagging tonicity by iron, strychnine, and phosphorus, but with emotion at a constant high pressure working power, with corroding care, like dry attrition, wearing away the nervous structure, the benefit must be not only transient but illusory.

By all writers upon longevity is tranquil states of the mind spoken of as one of it most common belongings. A fast life is known to be incompatible with a long one, but those whose maxim in youth is a short and sweet life, usually find, when it is too late, that the result is not only short, but sharp and bitter.

Sleep is the rejuvenation of nervous power, the winder up of mental force, which gives a good running power for the day. Unless this is gained, the whirl of molecular action in the brain is too great and prolonged; not made by an outlay of periodical accumulation, but by reserve capital. Of course the result is as disastrous vitally as such a course would be financially. Hugh Miller and Charles Dickens are noted and lamented examples of those who have made, to use an emphatic phrase, an extravagant outlay of brain power and broke it. But for one who kills himself thus, dozens so impair their energies that they linger on in torture, in incapacity, or imbecility for years. The great pity is that no timely warning voice is raised to teach men how they ought to use themselves. There are some seventy thousand of us in the United States engaged in the attempt to mend the breaks or the effects of the misuse, but scarcely one whose life is devoted to the instruction necessary to enable mankind to avoid them. I cannot believe that many in our profession do not desire to see the human family redeemed from the slough of disease into which they have sunk. Influenced by interest like others, physicians have yet, whenever clearly in their power, risen above it, and advocated strin-

gent measures for the prevention of disease. Nor should it be a matter of surprise that they have not accomplished more in this respeet, for the grand current of their education and their time is so monopolized in diligent efforts to cure disease, that little leisure is found for thinking and teaching how to avoid it; besides, their efforts are usually opposed by all the ignorance, conceit, and cupidity of the community.

Moreover, in teaching men how to avoid disease, to know is one thing, to practice another. I am firmly of opinion that all disease arises from ignorance of how we ought to use ourselves, or, when we know, wilful disregard of this knowledge. All the best of our race, when they *know* any course of conduct to be wrong and fruitful in evil, will strive to avoid it, while the worst will give no heed. Disease, deformity, and untimely death are, according to this point of view, the result of ignorance and disobedience; they are nature's punishments, therefore, as well as her modes of weeding out the worst and preserving the best of our race. Let us see to it, we who are able to communicate information, that only the disobedient succumb to her inexorable laws, or only those who know and yet do not, while those who are diligent inquirers after truth and virtue may not stumble on in darkness, but be enabled so to guide their behavior as that they and their children may prosper and multiply and their days be long.

The tenth and last law is

NO INTERMARRIAGE OF NEAR BLOOD RELATIONS.

When the stock raiser wishes to increase and perpetuate qualities peculiar to a certain stock, he is careful to breed in and in. It is found that by selecting the best males and females for multiplying a certain stock, the excellencies of the progeny are intensified, though when long continued, a delicacy or tenderness of constitution is apt to arise. If human beings were as perfect in development and as free from in-

herited taints as animals usually are, the same method would undoubtedly yield the same results. But not being so, and scarcely one in ten thousand who has not inherited some taint or weakness in some particular organ or part, it arises that in and in procreation intensifies the faults or weakness just as it does the excellencies. When a husband and wife are not consanguinated, the weakness or taints in each seldom affect the same part, or in the same way; the weak lines in one may be crossed in the offspring, so to speak, by strong lines in the other; but when of the same blood, the weak in one is not crossed by the strong in the other; the taint or weakness falls upon the same part, and hence its intensification in progeny. By whatever mode it is attempted to explain the injury which results by close blood intermarriages, there can be no doubt of the fact.

Dr. Bemiss, in an elaborate paper on this subject before the American Medical Association, gives the following statistics: In 833 blood intermarriages, the total children were 3,942, of which 1,134 were defective, 883 died early, 145 deaf and dumb, 85 blind, 98 deformed, 308 idiotic, 38 insane, 60 epileptic, 300 scrofulous. Dr. Howe, in a report presented to the Legislature of Massachusetts, ascertained the parentage of 359 idiots, and one twentieth of them were the offspring of blood intermarriages; and all sorts of defects, such as deafness, insanity, etc., in about a similar ratio.

Dr. Nathan Allen, in an excellent monograph on the intermarriage of relations, gives the following facts bearing upon this point: A certain family of wealth and respectability have intermarried for many generations, until there cannot be found in the three families a sound man or woman.

Dr. Buxton, of Liverpool, states that in 170 families thus, 109 of them had each one deaf and dumb child, 38 had two such children, 17 had three, 3 had four, one family had six, another seven, and another eight.

Dr. Cadiot states that out of 54 such marriages 14 were

barren, 7 produced children which died before arriving at adult age, and 18 produced scrofulous, rickety, consumptive, deaf and dumb, or idiotic children.

Many more figures of a like import might be adduced were it needful, but I take it that your minds concede the disastrous effects arising from the infringement of this law, and that our State authorities would show greater wisdom, philanthropy, and economy if they would endeavor to *prevent* the increase of these melancholy deformities of mind and body, instead of simply caring for them in our ever growing and crowded asylums. Civil law more extended than its present range concerning blood intermarriages is needed, but above all should our young men and women be well taught that such marriages may be productive of the most terrible and melancholy results to offspring of which any conception can be formed, and so serve to prevent that affection, yea, even the thought of it, which leads to the marriage rite.

Such, in my estimate, are the laws appertaining to the preservation of health, apart from what is ordinarily understood by prophylaxis. The application of these infringements in the elucidation of the causes of disease has been necessarily brief, and more suggestive than thorough. Closely studied and minutely applied, in all their diversities and complexities, they will, it is opined, be found to cover nearly the entire field of the ultimate etiology of disease. Moreover, I regard their infringements as the essential factors in nearly every morbid process. The light their study is capable of shedding upon the causes of disease is invaluable. Medical literature, it must be acknowledged, is exceedingly meager and indefinite upon this head. Even with infection, malaria, and cold, the three grand factors, how vague are the ordinary conceptions of causes! Patrons ask, "Doctor, what is the cause of croup?" and the answer is, cold. "What is the cause of lung fever, of rheumatism, of tubercular meningitis, of bronchitis, of peritonitis?" and the answer is the

same, cold. Now, the lack of logical precision, not to speak of the absurdity of such a way of thinking, is shown by the diverse effects of a wave of cold air sweeping over a continent. Upon one, it is said to produce this disease, upon another that, but upon the greater number it produces no ill effects whatever, but just the opposite, *i. e.*, the cold air braces and invigorates. Now, a cause, in the proper meaning of the term, cannot produce opposite effects; *i. e.*, disease is one, and better health is another. The true cause of such diverse effects is within, and is produced, immediately or remotely, by a violation of one or more of the laws of health. Remove or obliterate these, and man would be as free from what is termed the bad effects of cold as the animals around us, and he would become, as he ought to become through his superior insight, the most healthy, instead of being, as he now is, the most sickly of beings.

It is well known that man's physical condition has undergone considerable improvement within the last two hundred years. The causes of some pestilences have been destroyed, the average duration of life has been increased, the scourge of the seas is no more, and the causes of the only widespread and fearful epidemic of recent times, the Asiatic cholera, are now within our power. Budd, Parkes, Harris, and Pettenkoffer admit in some German cities, in Southampton and New York, that cholera was stamped out and did not become epidemic, though the germs were imported again and again for several months, as in New York, and into a population extremely favorable to infection; so that henceforth the responsibility for the presence of Asiatic cholera must rest wholly with municipal authorities.

I might further instance the particulars of the remarkable exemption of the federal troops, in occupation of New Orleans for three years, from yellow fever, wholly due to the wise and rigid enforcement of sanitary measures, had I time, but I feel compelled to ask your indulgence to the following striking passage from Prof. Parkes:

"The history of sanitary science affords many striking instances of the removal of disease to an extent almost incredible, but no instance is more wonderful than that of the West Indies. Formerly, service in the West Indies was looked on as almost certain death. It is not fifty years since the usual time for the disappearance of a regiment of 1,000 strong was five years. Occasionally, in a single year a regiment would lose 300 men, and there occurred from time to time epochs of such fatality that it was a common opinion that some wonderful morbid power, returning in cycles of years, some wave of poison swept over the devoted islands, as sudden, as unlooked-for, and as destructive as the hurricanes which so sorely plague the

'Golden isles set in the silver sea.'

What gave countenance to this hypothesis was, that sometimes, for months or even for a year together, there would be a period of health so great that a regiment would hardly lose a man. But another fact less noticed was not so consistent with the favorite view. In the very worst years there were some stations where the sickness was trifling, while, more wonderful still, in the worst stations, and in the worst years, there were instances of regiments remaining comparatively healthy, while their neighbors were literally decimated. And there occurred also instances of the soldiers dying by scores, while the health of the civil inhabitants in the immediate vicinity remained as usual.

"If any thing more were wanted to show the notion of an epidemic cycle to be a mere hypothesis, the recent medical history of the West Indies would prove it. At present this dreaded service has almost lost its terrors. There still occur local attacks of yellow fever, which may cause great mortality, but for these local causes may be found; and apart from these, the stations in the West Indies can now show a degree of salubrity almost equally, in some cases surpassing, that of the home service.

"The causes of the production and the reasons of the cessation of this great mortality are found to be most simple. It is precisely the same lesson which we should grow weary of learning if it were not so vital to us. The simplest conditions were the destructive agents in the West Indies. The years of the cycles of disease were the years of over-crowding, when military exigencies demanded that large garrisons should hold the island. The sanitary conditions at all times were, without exception, infamous. . . . . .

"It was held to be the climate, and the climate, as in other parts of the world besides the West Indies, became the convenient excuse for pleasurable follies and agreeable vices. In order to do away with the effects of this dreaded climate, some mysterious power of acclimation was invoked. The European system required time to get accustomed, it was thought, to these climatic influences, and in order to quicken the process various measures were proposed. At one time it was the custom to bleed the men on the voyage, so that their European blood might be removed, and the fresh blood which was made might be of the kind most germane to the West Indies. At other times an attack of fever (often brought on by reckless drinking and exposure) was considered the grand preservative, and the seasoning fever was looked for with anxiety. The first statistical report of the army swept away all these fancies, and showed conclusively that instead of prolonged residence producing acclimatization and lessening disease, disease and mortality increased regularly with every year of residence.

"The progress of years has given us a different key to all these results. It is now fully recognized that in the West Indies, as elsewhere, the same customs will produce the same results. Apart from malaria, we hold our health and life almost at will." *

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* Parke's Practical Hygiene, pp. 536, 538.

With the single exception of vaccination, all the sanitary triumphs of man over disease have been achieved by a better observance of some of the ten laws of health; and, considering that there is scarcely one in ten thousand who does not violate one or more of these laws every day of his life, what may we not hope for were they all faithfully obeyed? The eradication of taints, the abrogation of deformities, the dying the death of pure old age, euthanasia, instead of the violent law-breaker's death, the death of disease, the prevention of so much suffering, misery, and gloom, of idiocy, of insanity, of blindness, and of imbecility; such results, grand as they are, are not any more for man to do for himself than he has done with the elements around him. He is their master, the minor ruler of the world causing his thoughts to vibrate through the mighty deep, analyzing the constituents of the sun and stars, and concentrating nature's forces within the hollow of his hand, saying to them, do this, and it is done. And yet, commander as he is over external things, he commands not himself; regulated as he is by law in his dealings with nature, the uses he makes of himself are *lawless!* Hence, his disasters, his sickness, his pitiable personal condition.

In the year 1864, in our two most populous cities, no less than 1,210,356 of the world's rulers lay groaning and suffering, many to die in fearful misery, and in the grossest corruption.

But a better day is dawning, a day when man will use himself by law, as he now uses the forces of nature, when he will clearly perceive that if he does not use himself according to law the results are quite as disastrous as when he attempts to use the external forces of nature, without reference to their laws; when instead of thousands being engaged in efforts to remove effects, the thousand diseases by which he is afflicted, their main labor will be in showing how to avoid causes, and our race will then be able to grow up strong, pure,

and symmetrical in body, the uses they make of themselves ruled by reason and reason by law.

The world moves, science progresses, and man is more than ever the monarch of all he surveys. But progression cannot always move in one direction; there are limits, and in the future, as in the past, investigation will turn back, double on itself, if I may be allowed the expression, and accomplish things hardly dreamed of to-day. And I predict that in turning from the grand triumphs over outward nature, investigation will be concentrated upon man's deplorable personal condition, and carry it, in process of time, to as great triumphs over the evils by which it is assailed as investigation has now carried man's command over external nature. It is for us, as medical men, to give the first impetus, and afterwards to direct and mould this new vein of progress for the accomplishment of this beneficent end, full in faith of the observation made by that profound philosopher Descartes, that "if it be possible to perfect human nature the means must be sought in the study of medicine."

Heretofore, and even up to the present moment, the principles and practices of hygiene have been too much left to itinerant charlatans. The regular medical profession have not displayed great zeal and readiness in disseminating its truths. In the wide road over which the millions throng, physicians have too long hung upon the rear, skilfully applying balm to the wounded and relief to the distressed, instead of acting as guides and monitors to the advance, awakening thought in the giddy and headlong multitude, how they can avoid pain, disease and untimely death. The signs of a more auspicious period, a period of progress in man's personal condition, are everywhere apparent. In some of the leading medical colleges of the world, within the last decade, chairs have been organized, devoted to improvement and instruction in hygiene; the public mind is eager, nay, hungry, for hygiene knowledge, and let me ask, why the

halls devoted to the exposition of sanitary science may not in coming time be thronged by hundreds and thousands seeking to know the proper uses they can make of themselves so as to avoid pain and disease, instead of, as in the clinical departments of to-day, seeking how they can be rid of their numerous diseases and live.

Hydrate of Chloral.

BY D. D. BRAMBLE, M. D., OF CINCINNATI, O.

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When we think of the worth of our predecessors, and that the greatest blessing for which they prayed, was

"Men's *Sana in Corpore Sano*,"

we blush at our own inferiority, though the telescope of science has revealed a perfect panoramic view of the citadel of medicine. The long and wearisome journey to the Jordan disappeared amid the more inviting and pleasant accessions to medical science.

Nature placed at our disposal in the *Papaverum Somniferum*, that noble principal, opium, that for countless ages relieved the suffering, soothed the smarting wound, and eased the stinging pain. Following in its wake came morphia, ether, chloroform, and chloral.

It would be vain for us to travel up the stream of time, and seek for a brighter history, and more flourishing age of medicine than that which crowns our profession to-day. The blue mist of fable and superstition has long since faded, and we now stand upon a tried foundation stone.

Anatomy, Physiology, Chemistry, Botany and Microscopy, has assumed for medicine the morning of a vast and glorious kingdom, whose temple of fame will cope with the hand of war, and accompany time through eternity.

At no time since the days of Æsculapius, has there been

as much interest displayed as marks medical pages to-day. Man seems cognate of his duty to man, and is establishing a therapeutical power, which no debt of gratitude can repay.

Our profession, shining with the transports of love, the fullness of life, the heaven-kissing ecstacies of hope, is rising in its temple of relief, vast, all beautiful and sublime, to its full meridian height, never more to culminate—and around it we should cling that it may be strengthened, so that by the touch of dissention it never can be shaken, but be permitted to rise and stand upon the topmost stone of the coliseum a twin sister of immortality.

CHLORAL.—(*Hydride of Trichlorcetyle.*)

(Symbol. $C_2 H Cl_3 O$.)

This body was discovered by Liebeg in 1832. It is the ultimate product of the action of chlorine upon Alcohol. ($C_2 H_6 O$.)

Alcohol may be decomposed by heat, electricity and chlorine. Chlorine gas is rapidly absorbed by alcohol, imparting to it a yellow color, and causing considerable rise in the temperature, which may cause the liquid to take fire, at the same time the chlorine abstracts hydrogen, which is replaced by chlorine, thereby producing hydrochloride acid, or aldehyde, acetic acid or acetate of ethyl, or chloride of ethyl, and finally chloral, owing to the amount of hydrogen displaced and chlorine supplanted.

The alcohol, by the action of the chlorine, is first converted into aldehyde, by the abstraction of 2 H, and the aldehyde is converted into chloral by the abstraction of 3 H, which is replaced by the chlorine.

If we take absolute alcohol, ($C_2 H_6 O$,) and pass chlorine through it until 2 H is displaced and supplanted by 2 Cl., we would then have aldehyde ($C_2 H_4 O$,) thus:—

$$C_2 H_6 O + 2 Cl = C_2 H_4 O + 2 H Cl.$$

If we then take the aldehyde and pass chlorine through

it until 3 H is displaced and 3 Cl supplanted, we will have chloral, thus :—

$$C_2 H_4 O + 6Cl = C_2 H_4 ClO + 3Cl H.$$

If only H were abstracted from the alcohol we would have chloride of ethyl.

$$C_2 H_6 O + H Cl = C_2 H_5 Cl + H_2 O.$$

If 4 H were abstracted and 4 Cl supplanted we would obtain acetic acid, ($C_2 H_4 O_2$), thus :—

$$C_2 H_6 O + H_2 O + 4 Cl = C_2 H_4 O_2 + 4 H Cl.$$

Hence we see that by abstracting 2 H, and supplanting 2 Cl, we obtain aldehyde and two parts of hydrochloric acid. And by abstracting from the aldehyde 3 H and supplanting 3 Cl, we obtain chloral plus three parts of hydrochloric acid.

Chloral cannot, however, be obtained direct from the action of chlorine on aldehyde. It may be produded in the first instant, but is soon converted into other products.

For the production of chloral from alcohol it is *absolutely necessary* that the alcohol be anhydrous, for if water is present some other product instead of chloral is produced. And even when chloral is made from absolute alcohol, there are other products accompanying it.

Chloral is also produced by the action of chlorine on starch and sugar. To make chloral from alcohol, use a long stem glass to contain the alcohol, and pass the chlorine through it. For making chloral the chlorine should be made from common salt, pulverized fine, peroxide of manganese and sulphuric acid (as this gives off chlorine more regular than hydrochloric acid and manganese.) The chlorine gas should first be passed through distilled water to wash it, and then passed over dry chloride of calcium to dry it, and then through the alcohol. Remembering that the alcohol must be kept cool to prevent its igniting.

At first the chlorine should pass through slowly, but after four or five hours it should pass through as rapidly as pos-

sible, or in other words, with great rapidity, for twenty or twenty-five hours, or until chlorine passes through pure. The alcohol assumes a yellow tinge, and gradually changes to a heavy syrup, which solidifies on standing for several days, and presents the appearance of a soft white crystaline mass, composed of hydrate of chloral, hydrochloric acid and undecomposed alcohol.

This crystaline mass is the *crude hydrate of chloral.*

Then take in volume one of crude hydrate of chloral and four of sulphuric acid, and agitate together until the crude hydrate of chloral is dissolved, or cut up—set aside—when in a few hours a thin, hard white stratum will form on the top. If this stratum should not form, the chlorine must be passed through the alcohol longer. If this hard stratum forms, lift it off, and to one part of this add five or six of pure sulphuric acid: apply heat and melt the crystaline mass, let it stand and rise again, then draw off with a *pipette.* Then distill over lime and remove the hydrochloric acid, and in this manner you obtain chloral pure, but not until you have repeated this process several times.

Stadler obtained chloral from sugar and starch by distilling with hydrochloric acid and per oxide of manganese.

Pure chloral is not known only as a chemical curiosity, it being so difficult to prepare it without having water in it—hence we use the hydrate of chloral and call it chloral. Chloral is greasy to the touch, and will make grease spots on paper that will soon disappear. It has a peculiar, pungent odor, and excites a copious flow of tears; its taste is greasy and slightly astringent. It acts very strongly upon the skin; and might be classed among the escharotics. It has no acid reaction, even when dissolved in water, and will not precipitate a solution of silver. Chloral is readily dissolved in alcohol and ether, and it will readily dissolve iodine, bromine, sulphur, and phosphorous, by the appliance of heat. The iodine solution presents a purple color.

Chloral, with a small amount of water added, solidifies and forms a mixed mass of hydrate of chloral. ($C_2 H Cl_3 O + H_2 O$.) The boiling point of hydrate of chloral is 230° Fah.; it solidifies at 104° Fah., but an excess of water will vary the solidification.

Pure chloral generally distills unchanged with pure sulphuric acid, but if hydrate of chloral be heated with sulphuric acid part of the chloral distills over into the anhydrous state, and the rest is converted into chloralide, ($C_5 H_2 Cl_6 O_3$) thus:—

$$3 C_2 H Cl_3 O + H_2 O = C_5 H_2 Cl_6 O_3 + 3 H Cl + C O.$$

Chloralide is insoluble. Nitric acid converts chloral into terchloracetic acid. ($C_2 H Cl_3 O_2$.)

Anhydrous metallic oxides, such as baryta, strontia, lime, cupric oxide, mercuric oxide, and peroxide of manganese, have no general or specific action on chloral. But alkalies, either solid or aqueous, readily decompose chloral at ordinary temperatures, converting it into a formate and leaving a portion of chloroform, and the chloroform is also partly decomposed by the potassium, thus;—

$$C_2 H Cl_3 O + K H O = C H K O_2 + C H Cl_3.$$

The chloroform that has thus been liberated is now seized upon by the overplus of potassium and chloride of potassium is formed, and carbonic acid liberated, thus:—

$$C H Cl_3 + 4 K H O = C H K O_2 + 3 K Cl + 2 H_2 O.$$

Ammonia forms with chloral a peculiar compound that will reduce silver.

Dr. Dumas investigated its chemical properties the second year after its discovery. Kopp, Wurtz and Regnault, also investigated its chemical properties, and it was placed among the alcoholic products in common with aldehyde and chloroform. Then for nearly thirty years this valuable chemical lay in darkness until Dr. Oscar Liebreich, who in searching for some way to liberate chloroform in the blood and produce a similar effect as by inhalations, commenced experiments

with this alcoholic product. It was ascertained that strong acids did not affect it. But if an alkali be added to a solution of hydrate of chloral, it would split up into formic acid ($C H_2 O_2$) and chloroform. The formic acid uniting with the alkali and forming a formate.

If to a solution of hydrate of chloral caustic soda be added, the formate of soda is left and chloroform is liberated. This then led Liebreich to believe that if in the crucible, by adding hydrate of chloral to an alkali, chloroform could be liberated, so in the human body if by adding hydrate of chloral to the alkalinity of the blood, chloroform could be liberated in the system and produce all the phenomena of inhalation of chloroform.

If then any alkali be acted upon by hydrate of chloral as potassa, soda, or ammonia, it is changed into a formate, and chloroform is given off, and a portion of the liberated chloroform unites with the potassa or soda, and forms a chloride of the alkali.

But if any amount of an alkali be added, only an amount corresponding to the contributing equivalent will be converted into formate, and chloroform corresponding will be given off, while the excess of the alkali will remain, and vice versa, if more chloral be added than the combining equivalent of the alkali, the proportionate quantity of formate and chloroform will be formed, and the excess of chloral will remain unchanged.

The fact of the evolution of chloroform from the uniting of an alkali with chlorine should be understood lest we combine an alkali with chloral in our prescriptions, and liberate chloroform long before the patient receives the prescription, and then instead of chloral he will swallow the formate of the alkali, and the sad tale of sorrow to the Doctor next day is, "your medicine did me no good; I didn't sleep any all night long."

The chemical affinities of this new agent needs to be

thoroughly understood by physicians and druggists. Hundreds of our physicians have prescribed it, and reported upon it.

Its physiological and therapeutical action has been tested and investigated by many of our leading physiologists, such as Demarquay of France, Drs. B. W. Richardson and J. R. Russell of England, Dr. Wm. Hammond of New York, Da Costa of Philadelphia, and a retinue of others. It has been used in experimenting upon nearly all classes of animals. It has been used in hospital and private practice with good and with evil results. And like any chemical that is clothed in mystery, from its intricate formation and so susceptible of change: being used by highly educated medical men and by ignorant pretenders. By graduates and non-graduates. By regular physicians and quacks.

Combining it with alkalies, acids, and saccharines—compounded by incompetent drug clerks, and given at random, so that to-day it has its laudations and detestations, and from the fact that its principal element is chlorine is evidence that it is highly susceptible of change—its affinity for other substances being so great.

Chlorine itself being a virulent poison, and the great number of compounds that can be formed from oxygen and chlorine, from water and chlorine, was a mountain for physiologists to overcome, and in placing chloral among the highest of our therapeutical agents, we will always have to contend against its tendency to chemical change. That it is, when pure and handled with care, a great somnolent anodyne, possessed of great therapeutical powers, we will not call in question. But that its destiny is to be to medicine what chloroform has been to surgery, we are not willing to admit. We have in this a great chemical agent, intimately in alliance with physiology, and in proportion to its greatness as a chemical agent so is its liability and minute susceptibility to chemical changes and its physiological actions will accord to

its chemical actions and be subject to as much change physiologically as chemically, and never can occupy that grand position to which Liebreich and Dumas ascribed to it.

Until lately chloral has always been investigated only in an abstract theoretical point of view, and never was known as a therapeutical agent much less one of the most efficient and precious.

Opening then before us in this day of modern light, and medical lore, with the veil of mystery still hanging before our eyes, is a field of inquiry and research, of which but little is as yet known, of the exact agencies and proficiencies of this novel drug.

Freeing ourselves from the restraint of all schools and "pathys," and relying upon the chemical affinity as revealed in the test tube and crucible, as well as in the human body, we are called to investigate and place upon our therapeutical list a novelty that no doubt is destined to be as the waters of a second Jordan, and cure all the ills to which human flesh is heir, and dare to almost stand face to face and grapple in a hand to hand contest with death.

Heretofore chloral, as has been said, was considered in an abstract theoretical manner. But now it should be considered in its general physiological actions.

1st. All theoretical changes alluded to are not to be found, unless by the most minute and thorough chemist, and physiologically we will have but few changes, so that we can with some assurance of success predict a glorious future for chloral.

2d. Chlorine with its great property of unstability in its separate state, has in chloral the form of great stability, owing to the components with which it is united in forming chloral, and thereby has less adaptability to physiological change in this form than any other.

Then when introduced into the organism we need not be alarmed lest it should assume divers numbers of compounds,

as it does in the chemists' hands, for these changes are mostly the finely worked-up discoveries of the chemist, formed only when certain minute proportions are made to exactly correspond.

Experiments upon animals and man have been instituted, and from these we may derive some of the more accurate actions of chloral on the organism, and perhaps learn how to administer it with more advantage to the patient and less injury to our reputation.

M. DEMARQUAY.

(Communicated to the Academie des Sciences.) His experiments upon rabbits:

"I have experimented on a great number of rabbits, injecting into the cellular tissue of these animals from 20 centigrammes to 1.20 gramme, without causing death in any of them; all in from fifteen to twenty minutes fell into a deep sleep. The duration of this sleep was between two and three hours, and however great had been the muscular resolution and the depression of these animals, they all recovered. On the following day they were in a marvellously good condition. I have been enabled to make use of the same rabbits in several experiments.

The following appearances may be made out by attentively watching them. The ocular and palpebral mucous membranes are injected. The ears are vascularized in a manner quite remarkable, one would think these animals had undergone section of the great sympathetic, according to the fine experiments of M. Claude Bernard.

There is no increase of temperature in the vascularized parts, sensibility seems to be quickened and their faculties exalted. The slightest pinch of the tail or ear, excites unruly movements and whining cries, such as are not heard when a healthy animal is irritated in the same manner. The pulse, under the influence of chloral, becomes extremely fre-

quent, and the animal temperature of the body is lowered. Frequently when narcotized by chloral they exhale by their nostrils the odor of this substance, which would lead one to suppose that it is not decomposed completely in the blood, if it be at all decomposed in the blood. (It seems that Demarquay doubts its decomposition in the blood.)

If one opens during life the bodies of animals narcotized by chloral they will find the abdominal viscera congested, the vessels of the messentery turgescent, the mucous membrane irritated, particularly that of the trachea. The central nervous system, the brain and cerebellum and their membranes, are strongly injected, as well as the cord and its membranes. But on account of the small size of the sympathetic I have not been enabled to recognize any change in color.

FISHES.—Fish are readily narcotized by hydrate of chloral. By mixing chloral with the water in which they are swimming they inhale it slowly, and at last fall asleep. A large carp was put to sleep by Dr. Sedgwick with a subcutaneous injection of 5 grains of the hydrate of chloral. The breathing is regular and gentle, altogether oblivious and insensible.

To insure their recovery they must be placed in good fresh water, so that the eliminated products may be quickly carried away.

MICE.—Mice are easily and readily narcotized by chloral. A half grain being sufficient to put a mouse weighing an ounce to sleep, and when asleep resembles a dormouse in a state of hibernation. They pass into sleep without any excitement, and recover without any baneful symptoms.

FROGS.—The poor frog has to suffer, and though he would gladly go "chug" into his watery home, yet insatiate man gathers him up, and subjects him to every torture and appliance that human ingenuity can invent, and then has him nicely prepared for his own stomach's sake.

Frogs are quickly and easily narcotized by chloral, a half grain being sufficient to seal his majesty in sound sleep, and three-fourths of a grain generally causes the largest and oldest frog to "sleep the sleep that knows no waking." As soon as the chloral begins to take effect, his head drops, his limbs are relaxed, his eyes close, and he quietly sinks into a profound stupor. His motions are cataleptic, his limbs remaining in whatever state they are left. The sleep in a frog will last for a period of 20 hours.

Take two frogs, give one a large dose and the other a small one, the one with a large dose will lay, with imperceptible breathing and seemingly dead, *and may possibly be dead,* while the one that was treated to a smaller will lay calm and breathe softly, and in about twenty-four hours, at a moderate temperature will wake up. They have no sensibility when under the full influence of chloral. Every function of life but the circulation seems stopped. And when sleeping so soundly as to pass for dead, place the web of the foot under the microscope, and there is seen the circulation going on in the most perfect manner."

There seems to be no sensibility. Then we would have:

1st. Deep sleep, quickly produced and if carried far enough, fatal anaesthesia.

2d. Chloral acting without any excitement.

3d. We find waking up without any bad effects—or more like awakening from a natural sleep.

4th. In fatal doses the nerve power of the heart is the last that suffers, and upon examination we find the auricles and ventricles filled with blood—as if life had been stopped by paralysis of the heart, paralysis seeming to take place first in the ganglionic cells of the brain, next in the ganglionic cells of the spinal cord, and lastly in the ganglionic cells of the heart.

This then leads us to seek for the action of chloral. We have seen that when the hydrate of chloral is treated with an alkali

it is resolved into a formate and chloroform is liberated. The blood is an alkaline fluid. If then the hydrate of chloral be introduced into the organism, every small particle of it will unite with and consume a corresponding quantity of alkali, and the decomposition of chloral will be effected only as the blood furnishes an alkali.

Chloroform being liberated in the blood, requires only the smallest space of time to be conveyed to the ganglionic cells of the cerebrum, when the minutest quantity of chloroform would then take on its first action in the ganglionic cells of the cerebrum,* and as the chloroform increases, the action increases and extends to the ganglia of the spinal cord, and lastly it extends to 'the ganglionic cells of the heart. The first action corresponds with the slowest possible elimination of chloroform, and the removal of chloroform from the body is *not* by its being converted into carbonic acid and hydrochloric acid, but passes off as pure chloroform.

Dr. Richardson says he detected the odor of chloroform in the breath of animals sleeping under the influence of chloral. This corresponds to the researches of Dr. Snow, upon chloroform, who showed clearly that its extrication was unaltered. Chloroform, which is the active agent produced by giving chloral, is most beautifully described by Dr. Simpson to the Medico-Chirurgical Society of Edinburg, on Nov. 10th, 1847.

As to why we use chloral in preference to opium, might be answered in the words of Dr. Snow: "For the same reason that you use phosphorous matches, instead of tinder box, an occasional risk never stands in the way of applicability." He no doubt thought of the Portland fire that was caused by matches, and yet every man, woman and child, still uses matches.

The organ most frequently smitten by chloroform or by giving chloral, is the heart. The lungs are affected by the

*Dr. Richardson, Medical Times and Gazette, Oct. 30th and Nov. 6th, 1869.

chloroform that is formed coming in contact with the pulmonary branches of the pneumogastric nerve, and they suffer from paralysis of these branches. Chloroform first affects the ganglia of the cerebrum, then the ganglia of the cord, and lastly the ganglia of the heart. The heart is affected last no doubt on acount of its great self-sustaining power. The heart, fed by the coronary arteries, receives the first blood thrown from it at every stroke, and since, as was shown, the slightest quantity of chloroform first affects the ganglia of the cerebrum, and the next larger quantity the ganglia of the cord—the last and greatest quantity would exert its influence upon the heart.

If then the blood by which the heart fed not only the whole body, but itself, is normal, then normal blood would supply the heart, but if the blood should contain chloroform, and thereby be abnormal, the heart would be the organ that would receive the first injury, and when this abnormality was sufficient to produce death, we would then have the nerve power of the heart smitten lastly by this agent. Birds were next taken.

Pigeons are readily narcotized with a small amount of chloral, from one and a half to two grains.

From the experiments of Dr. Richardson no excitement preceded the sleep, but the birds, as after chloroform, usually showed signs of nausea as they became drowsy. The character and degree of sleep varying with the dose; one grain and a half producing drowsiness in ten or twelve minutes; deep sleep in an hour, and two or three hours of interrupted sleep—2 grains produced deep sleep in ten minutes, with perfect insensibility for 26 minutes, and interrupted sleep for some hours. Two and a half grains produced complete anaesthesia in 20 minutes that lasted one to two hours.

With these sized doses they generally wake with slight reflex movements or with 2½ grain doses with tremors. Five

grains produced complete insensibility in 16 minutes, with convulsive movements and death in 50 to 60 minutes. Seven and a half grains produced insensibility in 5 minutes, and death in 47 minutes, preceded by convulsive movements.

In all these cases the odor of chloroform was distinctly perceptible in a few minutes after administration. In every bird there was a decrease of animal temperature, and the temperature varied according to the amount given.

Recapitulation of the experiments on pigeons.

1st Pigeon 1½ grains, deep sleep in one hour, no insensibility.
2d " 2 " " " " 10 minutes, insensibility for 26 minutes.
3d Pigeon 2½ grains, complete anaesthesia in 20 minutes, insensibility for 1 to 2 hours.
4th Pigeon 5 grains, complete insensibility in 16 minutes, death in 50 to 60 minutes.
5th Pigeon 7 grains, complete insensibility in 5 minutes, death in 47 minutes.

1½	grains	reduced	temperature	2° Fah.
2	"	"	"	5° "
5	"	"	"	8° "
7	"	"	"	10° "

Dr. Oscar Liebreich, in his communications to the Berlin Medical Society, gave its chemical history and chemical changes, and then the change in the organism together with its effects on animals.

A small dose, 1-10grammes, produced narcosis in a very young kitten. The animal sleeping quietly, did not manifest any of the excitant stage of chloroform anaesthesia. He produced hypnosis of nine hours duration in moderate kittens by injecting ½ grammes of hydrate of chloral.

His experiments upon frogs seemed to show more regularly and more clearly the effects of chloral. (When the ganglia of the cerebrum were effected.) The animal allowed himself to be placed in any position and so remain, (possessing reflex excitability.) Then came on a stage, (when the ganglia of the cord were effected,) when the reflex excita-

bility was lost, and if a fatal dose had not been employed the frog would return to his natural condition. But if a fatal dose was administered the heart would be found gorged with blood as though dying from heart paralysis.

In his communication he recommends the hydrate of chloral for neuralgia and rheumatism, for convulsive cough and tetanus, for acute mania, delirium tremens, gall stone, and for removing the pains of surgical operations. We will now quote from the researches of Dr. B. W. Richardson, of London.

Dr. Richardson tested the virtues of hydrate of chloral on fishes, frogs, mice, birds, and rabbits, and then administered it to man and recorded the same symptoms (so far as they had been traced) as in the lower animals. Long sleep, lasting for several hours, has resulted in men and women from one dose, varying from 20 to 60 grains, and men in the frenzy of acute mania have been brought into quiet sleep by one or two drachms. The sleep is gentle, with no symptoms of distress, and leaves no serious evil behind.

In every animal, from the lowest to the highest, the sleep is induced, not merely without pain, but seemingly with great pleasure, assuming their natural manner, the rabbit arranging himself, and the cat purring as they pass into calm and oblivious repose.

Weight seems to influence the effect—an animal weighing 3 ounces requiring 1 grain to be brought fairly under its influence, and the influence varies as the dose is less than 1 grain. In the human subject we must take into consideration not only the size and weight, but obesity, leanness, natural habit, and actual state of body in respect to sensibility. Though Dr. Richardson contends that "the quantity of the dose should vary with the weight of the body," we feel like assuming altogether a different theory for the gradation of the dose, to-wit, the dose of the hydrate of chloral should correspond to the alkalinity of the blood, since it is by the

evolution of chloroform from the contact of the chloral with the alkali of the blood.

The less alkali the less chloroform would be generated and the more alkali the more chloroform would be generated, hence the greater the effect, but with a small amount of alkali the more chloral should be given, so that a greater amount of carbonic acid would be generated in the second action, and the result desired would be approximated to. But with a great amount of alkalinity it is very easy to see that less chloral is required, or too great a quantity of chloroform would be generated.

Dr. Richardson then gives the following summary:

1st. Deep and prolonged narcotism can be safely produced by the hydrate of chloral.

2d. During a portion of the period of narcotism there may be complete anaesthesia, with absence of reflex action, and a condition in which every kind of operation fails to call forth consciousness.

3d. During the narcotism there are intervals of apparent exalted sensibility.

4th. In the transition from drowsiness to stupor, there is no stage of muscular excitement, but in birds there is vomiting, as is common in the same animal in the second stage of narcotism under chloroform.

5th. During narcotism produced by this substance, there is invariably reduction of temperature.

6th. The hydrate produces muscular relaxation, which relaxation extends to the muscles of volition and alike to the iris and muscular arterial system. From the condition of the muscles after death, we may infer that this paralysis is in part due to change within the muscular structure itself.

7th. The action of this substance on the nervous system is primarily on the sympathetic ganglia, afterwards on the cerebrum, and finally on the heart.

8th. Recovery when it takes place is followed by no bad results.

9th. In fatal cases the functions destroyed are—1st, The cerebral; 2d, The voluntary muscular; 3d, The respiratory; 4th, The heart.

10th. This substance, in small proportions, arrests in some degree the coagulation of the blood, and in large quantities stops the coagulation altogether. In large quantities it also destroys the blood corpuscles, and produces general destruction of the blood; but the dose required to produce extreme narcotism need not be so large as to lead to serious derangement of the blood.

11th. The phenomena observed correspond with those observed under chloroform, and the balance of evidence is that they are the result of the action of chloroform.

12th. Summing up the facts, the hydrate of chloral *produces sleep, removes sensibility, reduces the animal temperature,* and *causes extreme muscular relaxation.*

Taking these facts as our guide we may reasonably put it to the test for the relief of various diseased states and conditions.

Views of the editor of the London Lancet, Oct. 2d, 1869:

"The idea that the hydrate of chloral is intended to supersede chloroform, bichlorite of methylene, ether, or the other volatile anaesthetics, as an agent for removing pain during the performance of surgical operations, IS AN ERROR. Whatever may have been the hopes of the distinguished Leibreich himself on this point, when he originally thought of employing the agent, *they have not been realized.* Nor has it been put forward as the rival of the agents named for surgical anaesthesia. IT IS AS THE RIVAL OF OPIUM that hydrate of chloral demands our consideration. Speaking simply of its effects on the body, and leaving out of view the theory of its action, and its supposed decomposition within the organism, we may state definitely that the hydrate

when administered in an efficient dose, (a drachm is not an immoderate dose for an adult,) produces on man and inferior animals a kind of stupor or sleep, which may be made to extend over five, and even over seven hours, with comparative safety.

The stupor is sometimes preceded by nausea, and in birds it is always preceded by vomiting. It is attended with great muscular prostration, and with a decrease of animal temperature. During the period of stupor there is an interval of perfect insensibility to pain; but the interval is short, and for the greater part of the period the sensibility is either natural or *exalted.* This fact of the exaltation of sensibility which was especially dwelt upon by the reporter at Exeter, has been confirmed by the researches of Demarquay, of Paris, whose paper was noticed in the Lancet. It is a fact as curious as it is important; and indeed the whole subject is one of interest."

But, as we have already intimated, the first question to be made out in practice is, whether hydrate of chloral can be used for sustaining sleep in the same class of cases as those in which we now administer *opium.* We see that the editor speaks of two important actions: the first, is chloral the rival of opium or is it not. Second, does it exalt the sensibilities or not.

Views of Edward H. Clark, M. D., Prof. of Mat. Medica in Harvard University:

After giving the history of its discovery and chemical affinities, he says, "A knowledge of the physiological action of the hydrate of chloral on man is an indispensible guide to its use in disease. We do not yet comprehend this action completely, but we know enough of it to aid us materially in its chemical administration. The points of greatest importance to the practioner are its absorption, its elimination, the changes which it undergoes in its progress through the sys-

tem, and its action on the system from the period of absorption to that of complete elimination.

Hydrate of chloral is readily absorbed by the mucous surfaces of the stomach and rectum, and also by cellular tissue. It is easily and quickly absorbed by the stomach if largely diluted, and moderate doses may be absorbed in a few minutes. Fifteen grains were administered to a patient, who fell asleep in ten minutes, from which it is fair to infer that the whole or nearly the whole of the quantity given passed from the stomach into the blood within that space of time. The stomach appears to be capable of passing into the blood any quantity of hydrate of chloral that may be put into it, provided it is pure and sufficiently diluted. Hence any quantity of it may be given at a dose, so far as the stomach is concerned, that it is wise to administer.

PROGRESS THROUGH THE SYSTEM.

Hydrate of chloral goes from the stomach into the blood unchanged. In the blood it meets with an alkali, and experiments show that chloroform is evolved in the system the same as out of the system. The amount of chloroform thus given to the blood is proportionate to the quantity of chloral absorbed, and also proportionate to the alkalinity of the blood.

The total quantity of chloral is not immediately decomposed into chloroform. The chloral mixes with the blood, and passes with it to every part of the organism, and as it circulates, continues to yield chloroform until it is exhausted. In cases of fever of a low type, such as typhus and typhoid fever, when the blood is highly charged with ammonia, it is then in a state to extract chloroform from chloral more rapidly than when it is less alkaline.

Under such circumstances a given dose of hydrate of chloral should produce its physiological action more rapidly and powerfully than in ordinary doses.

ELIMINATION.—Most, if not all, of the hydrate of chloral is eliminated from the system in the form of chloroform, into which it has been changed.

ITS ACTION ON THE SYSTEM.—Hydrate of chloral, while in the system, affects especially the blood, the cerebro-spinal axis, the heart and arteries, the muscular system and temperature.

THERAPEUTICAL INDICATIONS.—The therapeutic indications and contra indications which these physiological phenomena point to are obvious. Hydrate of chloral may be given so as to produce sleep, diminish sensibility, allay irritation, slow the heart, relax muscular tissue, lower animal temperature, devitalize the blood, cause anaesthesia, and destroy life. Part of these phenomena have a therapeutic value, and part are toxic. They may be arranged in two groups.

THERAPEUTIC GROUP.—Sleep; diminished sensibility; diminished irritation; muscular relaxation; contraction of arteries.

TOXIC GROUP.—Slow or irregular pulse; complete anaesthesia; altered blood globules; great diminution of temperature; great muscular relaxation; death.

In the administration of chloral, it is its therapeutic phenomena and not its toxic that we wish to obtain. This can be accomplished by proper attention to the purity of the article and mode of administration.

As chloral has been used in a variety of diseases, and in various doses, with various effects, and even with no effect, we will submit a number of cases before we draw our conclusions.

CASES OF NEURALGIA.

CASE 1. By Dr. T. Spencer Wells, Medical Times and Gazette, Sept 18, 1869. Sciatica, two grains of morphia given subcutaneously were necessary to procure sleep. Thirty grains chloral given procured best night's rest she had enjoyed.

Same dose repeated following night with like result. Subsequently increased dose to 40 grains to insure perfect rest, which was always obtained except on one occasion, when, on account of a severe relapse, ½ grain of morphia and 1-60 grain atropia was injected two hours before administration of chloral. Drug continued for three weeks.

CASE 2. Lady: Occipital Neuralgia; thirty grains of chloral produced no hypnotic effect; the patient suffered so much from burning pain in the throat and stomach that she declined further experiment.

CASE 3.—By J. C. Ogilvie Wills, M. D. Facial neuralgia, treated by sub-cutaneous injection of ⅛ of grain of morphia at seat of pain, with instantaneous relief; this was repeated for four days, when he was complaining much of want of sleep, when 30 grains of chloral was administered. In less than seven minutes he fell into a calm slumber, which lasted for eight hours. The chloral was repeated each night until the patient was convalescent.

CASE 4.—By J. C. O. Wills, M. D. Most distressing case of neuralgia, where hypodermic injections of morphia and atropine, bromide of potassium in small doses, and opium in large doses failed to induce sleep; thirty grains of chloral was given; this also failed. Fifteen minutes after 30 grains more were given. Five minutes later the patient was sound asleep, and did not wake for seven hours. On the following night ʒj was given; sleep followed immediately, but not of as long duration.

For the ten following nights, ʒij were given. Sleep invariably came on within five or six minutes, duration varying from eight to twelve hours, and the patient awoke on every occasion without experiencing any of the unpleasant after effects some have ascribed to this drug.

CASE 5.—By J. M. Palmer, M. D., Dalton, Ohio. Lady: victim of paroxysmal neuralgia of head as well as severe attacks of sciatica. Best known remedies gave only temporary

relief, often had to resort to chloroform during attacks of hemicrania.

During one of her accustomed attacks gave 10 grains of chloral; in an hour after free from pain, and quietly sleeping. At 1 A. M., three hours after, felt some pain; gave 10 grains, after which she slept till morning. At 10 A. M. found her suffering intensely, gave 10 grains; waited an hour, no relief; then repeated same dose, still no relief; then gave 16 grains; in an hour patient was relieved, and slept until night. At 8 P. M. pain returned; gave 20 grains, which had the desired effect; patient slept till next morning; has had no return.

CASE 6.—By G. R. Patton, M. D., of Cincinnati, Ohio. Neuralgia of head twelve years standing; attacks periodical, lasting four or five days; medication had little influence in limiting duration of disease. In one of her attacks, at its greatest intensity, administered 30 grains of chloral per rectum, from this she slept some. In two hours 30 grains more were given in same manner, and in half an hour she fell into a tranquil and uninterrupted sleep of six hours. When she awoke had no pain.

CASE 7.—By Dr. H. A. Spencer, of Erie, Pa. States in Medical and Surgical Reporter, page 401, May 14th, 1870, that he used chloral in one case of neuralgia without any good effect. He gave 30 grains in divided doses, his patient only slept half an hour; he repeated the medicine, the patient getting no rest or sleep until morphia was administered.

CASE 8.—By C. E. H. Rogers, London Lancet, May 28th, 1870. Relates a case of neuralgia in the supraorbital and intercostal regions, relieved by chloral, but was followed by intense headache, that only ceased on the suspension of chloral.

CASES OF TETANUS.

CASE 1.—Prof. Verneuil submitted to the Academy of Sciences, of Paris, the case of a young man who suffered

from tetanus in consequence of a crush of extremity of right radius. The patient took chloral for a week, the dose varying from 90 to 180 grains per diem.

CASE 2.—Mr. Spencer Watson, London Lancet, July 16th, 1870. Woman 41 years: traumatic tetanus. Chloral was given in intervals of four, six, and eight hours, in doses varying from 30 to 60 grains, for fourteen days; on one or two occasions coma seemed to be impending, the dose was omitted, but restlesness and lividity of the face having come on, with slight opisthotonos. During these intermissions the full dose was resumed, and these symptoms subsided. Bowels acted only after repeated doses of croton oil. Pulse varied from 70 to 120, temperature from $99\frac{2}{5}^{\circ}$ to $100\frac{2}{5}^{\circ}$. The jaws can now be opened and swallowing is quite easy for soft solids.

CASE 3.—Under the care of Mr. Moxhay, Royal Berkshire Hospital, L. L., Aug. 27th, 1870, page 293. Traumatic tetanus in man, aet. 25, occurring 10 days after injury; treated for four days with calabar bean, but without effect; then gave thirty grains of chloral, which produced five hours sleep. On waking spasms were less violent, and seemed altogether better. Dose repeated again, producing sleep; chloral continued for three days; 30 to 40 grains night and morning, always with relief to spasms, and followed by sleep. He then died from hæmorrhage from sloughing of vein.

CASE 4.—Under care of Mr. May. Traumatic tetanus. Boy: aged 13; treated first with calibar bean, 3 grains every 3 hours; difficulty increasing; spasms so violent as to require artificial respiration. Then gave with difficulty 30 grains of chloral which put him to sleep, slight spasms occurring during the night; after this 20 grains were administered per rectum once or twice daily, and always with the effect of relieving spasms and giving rest. On the 39th day had

scarcely any spasms; the enema of chloral continued. One month later he was discharged well.

CASE 5.—Under care of Mr. Birkett, Guys' Hospital, L. L., Sept. 24, 1870, page 534. Traumatic tetanus. Man: aged 26. Gave 30 grains of chloral every 4 hours for two days; continued to get worse; gave then in the place of chloral 1 grain of opium every three hours, which was continued for four days, patient getting worse. Then resumed chloral; gave first dose ʒi, followed by 15 grains every two hours; following day a little better; slept several hours. This was continued for six days; then increased the dose, giving 25 grains every two hours for three days. Then diminished to 15 grains every two hours; from this time medicine was given less frequent, and in three weeks chloral was left off.

CASE 6.—Great Northern Hospital, under care of Mr. Spencer Watson, L. L., Sept. 24th, 1870, page 434. Traumatic tetanus. Female: aged 41. This patient was kept more or less under the influence of chloral by giving 40 grains every four hours during the day, and 60 every six hours at night, often sleeping continuously for eight or ten hours, and even during the day remaining so profoundly unconscious that she was only aroused with difficulty. The chloral was then discontinued with a view of ascertaining how far the relaxation of the jaws already obtained would become permanent. On the following day patient became so violent both in her language and demeanor that it was necessary to put her in a straight jacket. Chloral was again given in 40 grain doses, with the effect of calming the excitement; this was then continued for nine days, then discontinued, the jaws remaining relaxed. Recovery was now steadily progressive.

CASE 7.—Dreadnought Seamen's Hospital, L. L., page 435, Sept. 24th, 1870. Idiopathic tetanus. Male: aged 37. Five days standing; four jʒ dose of chloral were given at

intervals of three hours. Four hours after last dose very decided and severe spasms, affecting the hands and feet, came on, eliciting loud cries. Pupils were then contracted; chloral discontinued for a time, and brought partly under influence of chloroform whenever there was a return of the spasms. During the afternoon of same day chloral was repeated and chloroform frequently given. The patient passed very little urine, had no stool, but took fluid food at intervals of about fifteen minutes, and had a very fair amount of quiet and genuine sleep. In the evening chloroform was again administered on account of an unusually severe spasm, with screams, but died very suddenly, 20 minutes after, in a severe convulsive fit.

The progress of this case was more hopeful than usual. The experience gleaned in this instance tends to indicate that chloral is worthy of an extended trial, with inhalation of chloroform, whenever the tetanic spasms threaten.

CASE 8.—Dr. Gronemaunhas, published in L. L., page 713 Nov. 19th, 1870, the case of a man aged 44: traumatic tetanus. Chloral alone did not relieve the spasms, but when *morphia* was given with it, the improvement was manifest. The prescription was as follows: Hydrate of chloral, 150 grains; hydrochlorate of morphia, 3 grains; aq. dest. and syr. simple, *a a* ℥jj. One fourth of this given night and morning. The man recovered.

CASE 9—Royal Surrey County Hospital, under Mr. Eager, L. L., page 742, Nov. 26th, 1870. Male, age 23: traumatic tetanus. Gave ʒj, which was then followed by 30 grains every three hours. Chloral continued for three days with apparent benefit; succeeding three days chloral was given in same way, but patient continued to grow worse, and died at end of the sixth day.

CASE OF ACUTE TETANUS, TREATED BY HYDRATE OF CHLORAL AND PHYSOSTIGMA.—Reported by W. W. Dawson, M. D. Mr. K., a gentleman 51 years of age, a me-

chanic, of good habits and excellent health, received a wound in the foot by stepping upon a nail. The iron penetrated the foot about midway between the great toe and its neighbor, and a short distance behind the junction of the two.

I saw this patient with Dr. Rogers on Saturday, the 11th of March, the fifteenth day after the receipt of the injury. The wound healed promptly, with but little if any suppuration. On the eleventh day he was exposed to cold and night air, and on the twelth day he complained of some rigity and unpleasantness about his jaws. On the thirteenth day Dr. Rogers was sent for and found trismus well marked. He immediately placed him upon 40 grain doses of hydrate of chloral every two hours, and he was kept upon it alone until the evening of the fifteenth day. The chloral kept the patient quiet, induced sleep, but the disease steadily advanced. When I saw him he was in the following condition: Skin moist and cold, temperature 84; pulse 120 and feeble; countenance anxious and marked tetanic grin; trismus intense; muscles of the back and sides of the neck firmly contracted; injured limb rigid; respiration abdominal. After a consultation with Drs. Rogers, Elstum, Langdon and Jones, the patient was given the calabar bean tincture, three drops every four hours hypodermically, and fifteen drops by the mouth at the same interval. Eighteen hours after his temperature came up to 90; twenty-one hours to 91, and at the end of twenty-four hours to 98. His skin lost its moisture and became normal, his pulse fell to 110. His countenance lost the tetanic grin and presented a calm and happy expression. The trismus, opisthotonous, and rigidity of the limb less marked.

Thus far the bean had an unmistakable impression, but under its use convulsive actions were developed, accompanied by great distress and restlessness. Immediately after a spasm the pulse showed 130, soon fell to 110. The pain and restlessness were controlled to some extent by a return to

the chloral, but at 9½ o'clock on the night of the sixteenth day he died in a violent convulsion.

In analyzing this case it is apparent that the chloral acted as a hypnotic, but exerted no influence whatever upon the progress of the tetanus. The conduct of the physostigma was striking, it banished the tetanic grin, brought up the temperature from 84 to 98, warmed up the skin, reduced the pulse from 120 to 110 and gave it force, and lessened the muscular rigidity, but was not sufficient to control the disease.

CASE OF CHRONIC TETANUS TREATED BY HYDRATE OF CHORAL.—A patient was admitted to the Cincinnati Hospital during the past winter, with tetanus of ten days standing, the result of a slight scalp wound. Opisthotonos, trismus, abdominal rigidity and great epigastric distress. In this case the chloral was used, and in controling the pain it was successful. The tendency in cases ten days old is towards recovery, and I could not see that the remedy had any effect whatever, except that which I have already indicated—it allayed suffering and induced sleep, whilst the tetanus exhausted itself.

CASES ON DELIRIUM TREMENS.

Four cases, reported by E. Hadly, M. D., of Indianapolis. First case gave ʒss of chloral at night; following morning found him in a half dozing condition; repeated dose, after which he slept well. Restlessness increased again at night; then gave ʒi of chloral, an hour later he was sleeping soundly. Next morning called for breakfast and ate heartily; from this time gradually improved.

Second, third and fourth cases were similar and with like good results.

Six cases reported by Dr. Balfour, Edinburg Medical and Surgical Journal, May, 1871. First one of maniacal ferocity, and had been under treatment for three days. Two

doses of chloral, 30 grains each, with an interval of an hour between them sufficed to induce refreshing sleep and restore patient to health. The five other cases of varying, degrees of severity, all with most satisfactory results.

Three cases reported by Dr. W. J. Nichol, Nashville Journal, August, 1870. Chloral was given in 20 grain doses, at intervals of two hours. In each it was only necessary to repeat the dose once, sleep being induced.

Two cases, reported by C. A. Stivers, M. D., of San Francisco Pacific Medical and Surgical Journal, Aug. 27th, 1870. Both cases had to be confined in a jacket. First case took ʒii divided into four doses, in fourteen hours. Following day was discharged from treatment. Second case only required two 30 grain doses, with like result.

One case by Wm. S. Bowen, M. D., Asst. Surg., U. S. N. Male: aged 27; Seaman. Maniacal delirium; had been under treatment for three days. On admission gave 30 grains of chloral, an hour later 20 grains. Six and a half hours after he became more excited, and the hallucinations increased; gave then ʒj. Five minutes after he was seized with convulsions, similar to those of a person partly under the influence of *ether* or *chloroform,* and he unconsciously passed a large quantity of urine, this was followed by profound sleep, from which he did not awake for eleven hours, when he immediately asked for his breakfast, ate a hearty meal, then had several hours sleep.

Case of Failure.—London Hospital, London Lancet, page 804, June 4th, 1870. Male: aged 33. Took 20 grain doses; after taking five doses was quiet for half an hour, but no sleep. Chloral was continued for two days, was then placed on morphia, which produced sleep.

Three cases by Charles Murchison, M. D., L. L. D., F. R. S., Oct. 29th, 1870; L. L., page 596. First case gave ʒss every four hours; after second dose slept fourteen hours. Second case gave ʒss every four hours; after fourth dose had

a prolonged sleep, on awakening from which the symptoms of delirium tremens had almost disappeared, but he rapidly sank from an extension of a recent attack of pneumonia and died in three days.

Third case constant vomiting; gave bismuth and chloral, each ʒss every four hours; after six doses vomiting stopped. Chloral was continued as before, for two days, patient sleeping at intervals.

Two cases under care of Mr. Lansdown, Bristol Gen. Hospital. First case J: aged 41; compound fracture of tibia and fibula. Third day after admission delirium tremens came on; 30 drops of the liq morphia was administered hypodermically, but produced no effect. Then gave ʒi of chloral, this made him drowsy for a minute and nothing more. Thirty minutes after another ʒi was administered, in a short time he fell into a sound sleep which lasted for two hours. Then gave ʒi, after which he slept for several hours. He was much better, no delirium; gave ʒi following night.

Second case. Female: age 57; fracture of tibia; third day attacked with delirium tremens. Gave 30 grains; excitement increased. She then took a ʒi without effect; in half an hour dose was repeated; this did not absolutely quiet her; again repeated dose in half hour. This finally quieted her, after which she had a deep sleep, breathing heavily, but presented no cause for alarm. After this sleep she was free from delirium, but two doses of ʒi each was subsequently given, simply to procure rest. Of these two cases the man took ʒiii in first six hours, the woman took same quantity in one hour in addition to ʒss she had taken during the day.

Case by Henry T. Chapman, M. D., London Medical Times & Gazette, page 419, Oct. 2d, 1869. Male: age 60; three previous attacks, sleep had been procured by morphia. In this attack it signally failed. Five hours after the last ineffectual dose of morphia gave 30 grains of chloral. In less than five minutes he was asleep, and slept heavily for nearly an hour,

the muttering and convulsive movements ceasing entirely after half an hour. On waking he was quite composed and rational, drank some brandy and water, took 20 grains more of chloral, and again fell into a lethargic sleep, which lasted seven hours, after which he steadily improved.

Delirium tremens is one of the many maladies in which chloral has been used with advantage. It is a remedy for producing sleep, particularily in those cases where opium is contra-indicated. It does not interfere with elimination by the kidneys like opium; the existing impurities of the blood favor the action of chloral by assisting in the liberation of chloroform. One caution with regard to it is necessary. Not only in this disease, but in others, the first action of chloral is rather exciting than sedative, and when continued will often produce the desired sleep.

CASES OF CHOREA.

CASE 1.—By Dr. Britton, London Lancet, page 634, Nov. 5th, 1870. Patient aged 9; began to show symptoms of chorea three months previous to presenting herself for treatment; at this time she could neither articulate any words nor sit still in a chair, nor walk. If left alone she would fall out of her chair. She could not eat, so great was the difficulty of swallowing. After treating her for six weeks with iron quinine, sulphate of zinc, strychnia, bromide of potassa and digitalis, without improvement, gave 10 grains of chloral at bed-time which procured her a good night's rest, followed by marked improvement during the day. This treatment was continued for four nights, and in two weeks was discharged well.

CASE 2.—By Dr. James Russell, Medical Times and Gazette, page 30, Jan. 8th, 1870. Chorea during pregnancy. M. E. M., aged 21, five months advanced in pregnancy, with first child. Choreic movements developed themselves

from an unusually early period of gestation almost from beginning. For two or three weeks previous to treatment movements had become violent, so that she was unable to stand, and was confined to her bed. Sleep very much disturbed. Lost the power of articulating. Full doses of bromide of potassa failed entirely; then gave in twenty-four hours seven doses of chloral. First two doses 10 grains each, succeeding ones of 15. First two doses procured some sleep, but after the third sleep became more continuous, lasting successively for three, five, and three and a half hours. While awake the movements were much less. She was kept under the influence of chloral for ten days and in one month thereafter discharged, nearly well.

MANIA.

CASE 1.—By Alex M. Adams, M. D., London Lancet, Jan. 22d, 1870. Slender, delicate looking woman; four days after confinement attacked with ungovernable mania; shaved head and applied leeches and ice; gave ʒss bromide of potassa, and repeated it in two hours; mania continued; twenty-five hours after attack gave 40 grains of chloral; in five minutes she was calm, in ten minutes fell asleep. The mania being periodical chloral was given at times in 40 to 60 grain doses for a fortnight with favorable result.

CASE 2—By A. H. Hunt, M. D., Medical and Surgical Reporter. Female: dementia of eleven years standing, a very noisy case; was treated with marked success by chloral in 10 grain doses as required.

CASE 3.—Thomas H., age 62: periodical insanity of 30 years standing; 10 grains of chloral always produced five to six hours sleep.

CASE 4.—Jane C., age 60; despondency and melancholy of a suicidal nature. Four years standing; was decidedly benefitted.

CASE 5.—M. T., age 52, acute suicidal mania of five years standing, supposed to be caused by uterine trouble. The patient is laboring under the delusion that she is debarred from the privilege of entering heaven. She was easily controlled by chloral. He also reports five other cases controlled by chloral, 10 to 20 grains producing five to six hours sleep.

W. J. Elstun, M. D., in a paper read before the Indianapolis Academy of Medicine, reports five cases of insanity, where chloral produced quietude or sleep in each for several hours, but had no perceptible effect in allaying the mania.

Dr. Clouston, Medical Superintendent of the Cumberland and Westmoreland Asylum, says that it is a certain sleep producer, that by the use of chloral, attacks of insanity may probably be warded off in some cases; that its action is especially applicable to recent cases of insanity, or to subdue temporary excitement.

He, however, states that whether it does good or not it *never does harm,* and in this respect is *king of all* NARCOTICS.

PUERPERAL CONVULSIONS.

CASE 1.—By R. D. Fox, M. D., London Lancet, July 16th, 1870, page 101. E. S., age 15½: primipara in labour eight hours, and had progressed satisfactorily till a few minutes before I was called, when, the head having begun to press well on the perineum, the girl went off into puerperal convulsions. Fits were frequent but not powerful, sensible during the intervals. Ordered at once some calomel, sinapisms to neck and turpentine enema. Four hours later fits more severe and frequent; two hours later fits almost continuous; totally unconscious and very much exhausted. Delivered her with forceps of a dead and partly decomposed child. The fits then for four hours increased in severity and frequency, pupils dilated and hardly acted at all. She

had a feeble pulse of 100. Gave 30 grains of chloral, saw her two hours later, had only one fit, pupils normal and acting. Eleven hours later she was in a fitful sleep, tossing about the bed a good deal, and with occasional twitching. Gave the second ʒss of chloral; followed by a quiet sleep of six hours. Then gave 10 grains every four hours, in a mixture, with small doses of digitalis, hyoscyamus, and bicarbonate of potash; continued to improve. No family or previous history of epilipsy.

CASE 2. By A. C. Campbell, M. D., London Lancet, page 153, July 30th, 1870. Mrs. J., age 28; primipara, full time, along with the first labor pains a very severe epileptic convulsion made its appearance, the paroxysms recurring every half hour, at the commencement of each labor pain, and leaving her unconscious during the intervals; gave 40 grains of chloral, no return of convulsions; pains increased, both in strength and frequency. She remained insensible and quiet, only being aroused by the pains. Delivered in three hours after administering chloral, of still born child. One hour later left her sleeping soundly, having no knowledge of a child having been born. Three hours after delivery convulsions recurred with more or less severity every fifteen minutes, along with after pains. Thirty grains of chloral was given, and in 20 minutes she was asleep and slept well all night, no return of convulsions. Made a good recovery.

CASE 3.—Reported by Baron Paul von Sergdewitz, of Bale, (British Medical Journal,) to the Obstetrical Society of London, case of violent puerperal convulsions in a woman suffering from endocarditis, subsequent to delivery, in which chloral at once arrested the fits, after various other remedies had been used in vain.

CASE 4.—By Dr. Milne; Edinburg Medical Journal, May 1870. The case was purely a psychial one, due to the shock of a sudden, loud and unexpected sound; the benefit he ob-

tained from chloral was considerable, although not sufficient in his estimation to send one into ecstacies, or impress one with the belief that a novel cure had been brought before us of unexampled power.

CASE 5.—Communicated to the Imperial Surgical Society, March 23d, 1870. Puerperal eclampsia in a primipara; convulsions came on during labor, and continued after delivery. All the ordinary remedies having failed to afford relief, chloral was had recourse to, in increasing doses, commencing with 4 grammes. When the dose reached six grammes, the patient fell into a deep and quiet sleep, which continued for twelve hours. After awakening, she had slight attacks, which were relieved by chloral, and complete recovery ensued.

PARTURITION.

E. Lambert, house Surgeon, Maternity Hospital, Edinburg, reports eleven cases of parturition, with the following results:

CASE 1.—Intolerance of medicine.

CASE 2.—A very quiet woman, devoid of excitability. Result favorable.

CASE 3.—The marked effect was a bringing about regularily of the recurrence of pain, and the great relief that she said the medicine gave her.

CASE 4.—Negative result.

CASE 5.—Parallel of case 2.

CASE 6.—Refractory.

CASE 7.—Ergot and chloral administered conjointly; too much antagonism.

CASE 8.—Marked cerebral disturbance for a short period.

CASE 9.—Very favorable result, but marked by the occurrence of sub-delirium half an hour after delivery.

CASE 10.—Perfect anaesthesia for half an hour.

CASE 11.—Painless labour throughout.

His conclusions are that chloral is an agent of great value in the relief of pain during parturition, and as demonstrated, labour can be conducted from its commencement to its termination, without any consciousness on the part of the patient, under the sole influence of chloral. The effects being continued beyond the completion of labour and the repose experienced by the patient after labour, is one of the favorable circumstances to be noted in considering its application to child-birth.

Chloral not only does not suspend, but rather PROMOTES UTERINE CONTRACTIONS by suspending all reflex actions which tend to counteract the incitability of the centers of organic motion. Labours under chloral will probably be found to be of shorter duration than when natural, for unconscious contractions appear to have more potent effects than those which are accompanied by sensation of pain. It should be exhibited in fractional doses, say 15 grains every quarter of an hour, until the required effect is produced.

PERTUSSIS.

"Alex. M. Adams, M. D., in London Lancet, Feb. 5th, 1870, reports having treated several cases of whooping cough in children five to six years of age, with 5 grains two or three times daily. If cough is worse at night increase the dose." I have found it a most valuable remedy, having treated many cases of whooping cough with favorable results, varying the dose from three to seven grains and repeating dose as necessary to allay coughing.

Dr. A. Ferrand repórts in the Bulletin De Therapeutique several cases with unbounded success, no coughing at night, but sweet refreshing sleep.

ASTHMA.

Several cases of asthma have been reported as being successfully treated by chloral. Dr. A. J. Miles, of this city,

presented me with reports of a number of cases of asthma which he treated with chloral in ʒss doses, the second dose generally producing the required result.

AMPUTATION DURING ANAESTHESIA, PRODUCED BY CHLORAL.—Dr. Noir published in London Lancet, Jan. 1st, 1870, a case of a man aged 64 suffering from osteo sarcoma of the leg. The patient was anxious to have limb amputated. Eight, A. M., took 60 grains of hydrate of chloral; up to 9 o'clock he frequently tried to vomit, with violent excitement, until 10 A. M.; he then fell asleep, and was insensible to so great an extent that he could be moved freely without waking. Sleep lasted one and a half hours; he awoke and wanted something to eat. Two days after took 75 grains at 8 A. M.; was uncomfortable for an hour, when he fell into a deep sleep, and underwent amputation of leg without moving or uttering a sound; the coma was so alarming and prostration so complete that Dr. Noir remarked that it would be *imprudent* to use chloral as an anaesthetic in operations if it continues to be followed by these dangerous symptoms. There can be no doubt but that the anaesthesia was complete.

Discoveries like this have long histories, and the efforts are often misdirected, the experiments insufficiently recorded, and the conclusions erroneously drawn from the crumbling dust of errors and imperfectious.

If we were to refer to various formed essays upon therapeutics that have appeared of late years, we would find that a certain timidity, has in many instances, induced authors to cling to phrases which represent physiological theories *now* virtually dead—and the use of these phrases has injuriously affected the value of our systematic teaching, on the subject and action of medicine, leading energetic and practical men to regard it as somewhat pedant and unreal, and hence the many misdirected uses, and entire failures which otherwise might have properly contributed praise according to deserts.

It is the general custom of writers on therapeutics to assume that the same qualities which distinguish the action of any drug when administered in large doses, must distinguish it when administered in a smaller quantity and *vice versa*, the only difference being of degree and not of kind.

Thus: opium in a medicinal dose produces sleep, in a poisonous dose coma, the latter cause being argued as the extreme development of the other.

If the dogma that the action of a drug is essentially the same though not in degree, be true in any sense, as would warrant its being assumed as a basis of therapeutical inquiry it ought to be true universally—but not so.

Thus: common salt in small quantities is a perfectly indispensible article of human food, in a medium dose a safe and useful emetic medicine, while in extremely large doses it is an irritant poison and has caused death. (Med. Gazette vol. I., p. 559—1840.)

The same might be said of iron, which is one of our most valuable tonics, given in small doses, but in large quantities it is a most violent irritant, and will poison. So with strychnia and arsenic in their therapeutical dose we have a powerful tonic, and are often the resort in extreme cases, but in large quantities they tell in action louder than words. The same might be said of chloral, whose therapeutical action consists in a regular progressive extinction of the vital properties of the various portions of the nervous system.

Producing first, with a small dose calmness and tranquility as shown in Dr. Patton's case, (case 6th in our report on neuralgia.)

2d. Producing deep sleep, insensibility, as shown by Dr. Richardson in his experiments upon the pigeon, and as shown by Dr. J. C. O. Wills' case (case 4th neuralgia) when deep sleep was produced for 7 hours.

3d. Deep sleep with complete anaesthesia, as in the

pigeon when 2½ grains were given. As illustrated by Dr. Chapman's case of delerium tremens.

4th. Complete insensibility as when 5 grains were given to the pigeon, and as recorded in Dr. Noir's case of amputation when 75 grains were taken at one dose.

6th. Death as when seven grains were given to the pigeon but not as yet verified on man.*

My experience with chloral has shown that a small dose first produces a slight invigoration, with face bright and intelligent, only to a degree proportionate as shown in perfect health, or owing to the ratio it exerts itself upon the physical characters of the corpuscles before it diminishes the power of the organic constituents of the blood to unite with oxygen.

2nd. With the dose increased *pro re nata* we have the coordinate voluntary movements affected, then impairment of consciousness with a sweet sleep following. Fall of temperature and respiration; giving the full effects of a hypnotic, with all the pleasing results that could be wished for, or in other words producing natural sleep. The same results having been corroborated by Dr. Ferran in his cases of pertussis.

3d. I find that by increasing the dose proportionally to the person, we next produce a deep sleep with insensibility, that will last for hours even with noise and jostling around but no dreams, the sleep seemingly being too deep, and having on waking a tendency to depression. The depression that I have witnessed after giving large doses of chloral, seemed to have prostrated Dr. Noir's man after amputation so much that he became alarmed and remarked that it would be imprudent to use chloral as an anaesthetic in operations if it continued to be followed by these dangerous symptoms. Its effects upon a healthy system has no comparison with other hypnotics or anaesthetics.

The ancient Egyptians used many drugs for producing a state of intoxication or ecstacy; consisting of Indian hemp

* Since writing the above one death has been recorded.

and the juice of the poppy, and when opium was scarce they used the "electuarium bernavi." The effects of these preparations of Indian hemp were, first exhilarating, then the men became talkative and would sing love songs and laugh; then they were rendered delirious and would fight and mutilate each other; then after an hour or so came a stage of wild excitement, with violent anger; lastly a stage of grief during which they lament and weep, then they return to normal health. Prosper Alpinus gives the formula, white poppies, seeds of henbane, opium, stem and flowers of euphorbia and saffron. The effects may be imagined from the nature of the ingredients.

The ancient Scythians used to breathe the fumes of burning hemp, just as the Hindoos do now; just as the Chinese smoke opium. The custom of inhalations, too, was very widely spread among the barbarians along the shores of the Caspian, who lit fires of fruits and seeds, and sat around them breathing the fumes, till they became intoxicated; or as the Indians who throw tobacco on their fires during religious ceremonies, to transport them into ecstacy; or as the priestesses at Delphi who became half intoxicated by the fumes of narcotic plants, before delivering the oracles. In the 12th century the famous confection of Hugo di Lucca* was used to produce sleep. And these usages no doubt had a tendency to lead to the search and discovery of anaesthetics.

Opium eaters who are so abundant over our land, say that they eat it for the happy effects and pleasing sensations that it produces upon the healthy economy, and some become so accustomed to it that they can tolerate enormous quantities. Chloroform produces dimness of vision, then exhilaration with disposition to talk, laugh and sing, dreams and fancies occur, events of past life may be recalled, conversations may be repeated and actions produced. Sailors sometimes go

* Composed of opium, henbane, mandragora and hemlock mingled with various juices.

through their nautical maneuvers, young ladies will sing "Beautiful Star," some will pray, some swear, and others will relate their love mishaps. But not so with chloral, it has no tendency to produce any such state of ecstacy as Indian hemp, or the pleasing effects of opium, neither has it any of the exhilarating tendencies of chloroform when inhaled, though the active principle is chloroform liberated in the blood. Hence we have the full assurance that it can not be used by the common people to abuse themselves with—producing their supposed happiness. This property of the drug is one of the best recommendations to its adoption into common use.

This genial idea that was implanted at an early day and beautifully described by Helen to Menelaus when she offered him the "sleeping" cup:

> "To clear the cloudy front of wrinkled care,
> And dry the tearful sluices of Despair:
> Charm'd with that virtuous draught, the exalted mind
> All sense of woe delivers to the wind."

Though once developed into boldness and almost general use, and is even now destroying the happiness of thousands of families and homes, should be superseded—old systems should be discarded and new ones adopted for reformation if nothing more. And chloral I am proud to say will not admit of being used, so that our fellows can be called "chloral eaters." True the use of chloral will produce sleep and destroy physical pain, but the exhilarating effects, such as opium produces, are absent in chloral. It will cause no change in the senses as its action prevents oxygenation, it diminishes the arterial supply, causes a sluggishness of flow in the capillaries; then extending to the nerve filaments distributed to the lungs, producing shallowness of respiration. From its effects, due to the influence of an altered blood, suspended oxygenation, we can not foresee any abuse that it may be liable to by the common people.

By our own trials and the summary of all the cases that have presented themselves, we find that hydrate of chloral affects the human system as per the statements of Dr. Oscar Liebreich, who described it as first effecting the ganglionic cells of the brain, and the coordinate voluntary movements and impairing consciousness, holding in check only partly voluntary motion. The effect is then, if carried far enough, communicated to the medulla, whereby stertorous and laborious breathing is effected, and lastly the ganglionic cells of the heart, but this last has been verified only on the lower animals. Considering its daily and almost universal use there is no agent which seems to us to require more caution and more skill to obtain the good and avoid the evil which its use entails.

The dose of chloral must be regulated by the physician. My experience is that it should be used in fractional doses and repeated until the desired effect is produced, grsxx being nearly the standard dose.

Report on Ophthalmology.

BY W. W. SEELY, A. M., M. D.

Prof. of Ophthalmology and Aural Surgery in Medical College of Ohio.
Oculist to Cincinnati Hospital, and Good Samaritan Hospital.

REPORT ON OPHTHALMOLOGY.

BY W. W. SEELY, A. M., M. D.

Prof. of Ophthalmology and Aural Surgery in Medical College of Ohio.
Oculist to Cincinnati Hospital and Good Samaritan Hospital.

My original design was to present a paper on some one subject in my department, but on a recent visit to Columbus my friend, Dr. Hamilton, suggested that I so change my plan as to embrace several subjects, and thus allow it to assume more the character of a *report*, as he would be unable to prepare one. However, I have not allowed it to take on a very general character, having confined myself to four topics.

In my examinations of the pupils of the Blind Asylum—a liberty so kindly granted me by Dr. Hamilton—I found nearly one fourth of the entire number, eighty-eight, were victims of trachoma, or granulations, the eyes either being totally destroyed by ulceration of the cornea, or so nearly as to render the subjects practically blind. The propagation of the advanced views in the pathology and treatment of granulations is bearing good fruits in greater abundance each year. Still the old idea that granulations are something to be destroyed, no matter at what expense, has not yet been supplanted completely by the new and more rational one.

Whether we regard granulations as due to a plastic exudation, in which a cellular tissue of new formation, not reaching full development is produced, that which in its organization

and subsequent conversion into a dense fibrous tissue, by contracting, destroys the tissue where it had its origin; or whether we adopt the view taken by Wecker, and so clearly brought out in his "Traite Theorique et Pratique des Maladies des Yeux," and which I presented to readers of the "Western Journal of Medicine" in June and July, 1868—that they are a neo-plastic formation, due to a proliferation of the connective cells of the conjunctiva; or again the view held by Stromeyer, by Bendz, by Warlmont, by Marston, that they are developed from those *follicles* of Krause, bodies that correspond to the solitary glands of the small intestines, or the little glands in Peyers patches—I say whichever opinion we may hold, in our therapeutics we must keep in view the great point so strongly insisted upon by Wecker and repeated by Wells, *i e* the necessity for maintaining a certain amount of inflammation in order to bring about the absorption, of the granulations.

Some years ago I recognized practically and was governed in my treatment by the same ideas as were deduced by Wecker from his studies of the nature of granulations.

Our success will depend, so far as relates to ourselves, on our judgment in maintaining the requisite amount of inflammation, so ballancing it that there shall not on the one hand be too much, nor on the other too little, for promoting the absorption of the neo-plastic tissue. The purpose of treatment is *not to destroy* the granulations.

The next class of cases I beg to call your attention to is affections of the cornea, suppurative keratitis and ulcers of the cornea. While writers give us two types of suppurative keratitis, the inflammatory and non-inflammatory, we must not forget that in practice the two shade off into each other continually, and a very great amount of skill and judgment are required to properly adapt our treatment. One of the prominent points, is to notice the amount of shading in the infiltration, the line of demarkation. The lower the type

the less this will be. In all forms of suppurative keratitis there are two things that can always be made use of in the treatment, viz: atropia and the compressive bandage. Of course if the inflammation is very high a little depletion, few leeches would be of service, cold and anadynes; then come in with the bandage. I can't insist too strongly on the use of these two things. The cornea in its normal state supports a certain amount of intra-ocular pressure; by the irritation produced by the inflammation this intra-ocular tension is increased; again the corneal tissue is weakened. So in the treatment of these forms of keratitis as well as the ulcerative form, one great indication is to relieve this intra-ocular tension and at same time support the weakened corneal tissue. There are three means of lessening intra-ocular tension, the use of atropia, paracentesis of the cornea, and by an iridectomy; the bandage and atropia are in the hands of all, hence I call such especial attention to them. In addition to the atropia and bandage, in the non-inflammatory type the chief indication is for warmth, hot water, or poultices, for half an hour or an hour at a time, several times a day, constitutionally, tonics.

In ulcers of the cornea, as in suppurative keratitis, we recognize two types, the sthenic or acute and the asthenic or indolent. Here again we look to a great extent to the width of the zone of demarkation to judge of the character, or the class to which it belongs. The great danger of course in ulcers of the cornea is a perforation of this membrane. In the acute form, while we endeavor to control the inflammation we must be on our guard not to use depressing treatment too freely as so frequently ulcers occur in just the class of subjects for tonic treatment. In the indolent form, constitutionally tonics are imperatively demanded, locally atropia, compress bandage, and warmth. Now we have seen that these two things are to be made use of in both of these two classes of corneal affections—the same indications are

presented, consequently the same therapeutic measures are adopted.

By special request of Dr. Hamilton I will call your attention for a few moments to glaucoma and its treatment.

Speculations on the nature and cause of glaucoma are not wanting, but they are still veiled in great obscurity, the difficulty lying to a great extent in the fact that in some cases there is inflammation and in others none. We have Donders on the one hand denying that the inflammation is an integral part of the glaucomatous process, only a complication, though usually occurring, not necessarily present. On the other hand we have the great master Graefe maintaining the inflammatory nature of the disease, accompanied by an increased secretion of the fluid of the eye and by augmented tension. You are aware that glaucoma is a disease of the eye, occurring more frequently in females than in males, very apt to appear after the cessation of menstruation; there is probably very little doubt that at least the *tendency* to it may be inherited.

Perhaps so far as relates to the so called acute glaucoma I need not mention the symptoms, only direct attention to the treatment. There is but one thing to be done, that is to make an iridectomy, but bear in mind it is not an iridectomy in the ordinary sense of the term, nor has size anything to do with it, except in so far as the chances are increased of getting a portion of the iris out close to its peripheric attachment, the indespensible condition. The points to be taken into consideration in the prognosis, both in the acute and chronic forms, are not the amount of pain and tension, *but the amount of vision and the field of vision.* In the acute forms, if the cases are seen within two weeks, provided there is good quantitative perception of light and a good visual field, one may predict restoration of vision by iridectomy. The chief difference between acute and chronic glaucoma is, after all, in the greater or less absence of symptoms of

inflammation and pain. In the chronic form we may have attacks of periodic dimness of sight, attended with a slight amount of redness about the eye, cloudiness of cornea, of the aqueous and vitreous humours, a little pain—vision becomes restored, at a greater or less interval to disappear again, till finally we have only *remissions*, no *intermissions*.

I know of no more deceptive disease when occurring simultaneously in both eyes, for patients can't but believe that vision will continue to return as in previous attacks, and so before they are persuaded of the fatal character of the trouble they are hopelessly blind. I have already called your attention to the points that are to rule your prognosis. In a large portion of the cases there will be a haziness of the cornea of the aqueous humour, of the lens perhaps, and vitreous humour, so you will be shut out from the advantages of an opthalmoscopic examination. Now it must be borne in mind that the condition of the nerve in these cases is all important, so a careful examination of the field of vision must be made to see if all the retina still retains its seeing power, or what portions still retain this power, for an eccentric fixation for a point of light, that is, the directing some other portion of the retina besides the macula lutea to the object, or a slit like contraction of the field indicate a serious implication of the nerve, and consequently make the prognosis exceedingly unfavorable. Not that the only treatment for every case of glaucoma must not be resorted to, viz: iridectomy, but unfortunately while it may relieve the glaucoma the sight will be lost from the progressive atrophy of the nerve.

A very rare form of what is called glaucoma simplex came under my care a year ago in the city hospital; the man had only the slightest perception of light, tension a good deal increased, (T_2), no signs of inflammation; an opthalmoscope examination revealed a cupping of the papillar, and spontaneous pulsation in the arteries of both papillae, veins dila-

ted and tortuous. I made an iridectomy in both eyes upward, no irritation at all following. They had the effect to relieve the tension so it was less than normal, and after a few days the pulsation had disappeared in both eyes, though more readily producible in one than in the other; here of course the atrophy of the nerve had progressed too far to be arrested by any interference.

Ever since Mackenzie in 1844 described sympathetic ophthalmia as a form of disease distinct in its aetiology, its progress and treatment, it has been studied with a very great deal of interest and formed one of the most interesting topics of discussion at the ophthalmological congress in its meeting at Heidelberg in 1863. For the causes of sympathetic ophthalmia I may say that the most prominent are bodies penetrating within the eye—penetrating wounds, simple contusions, inflammations of the internal coats and portions of the eye, such as the iris and cloroid, followed by sensibility in the ciliary region, results of operations. It is generally admitted that the sympathy is propagated by the ciliary nerves. Graefe and Bowman first showed that the beginning of the sympathetic trouble may be in a symmetrical point in the opposite eye, and that so long as the ciliary region of the injured eye remains sensitive to the touch the danger of sympathetic trouble is not passed.

We have the sympathetic trouble showing itself in the form of a malignant iritis or irido-cyclitis, a serous iritis, and also choroids-retinitis, and I have had two cases of what has been described by Donders as "sympathetic neurosis," characterized by extreme photophobia and lachrymation inability to use the eyes, but no impairment of vision.

Dondess claims that this form of sympathetic trouble never terminates in the inflammatory form and cause destruction of the eye. The results of removal of the injured eye, however, are so marked that even if it was thoroughly established that such is never the termination of this neurosis it

would supplant all other treatment. I remember one case in particular that came under my care a year or more ago, in which there was intense photophobia and lachrymation, and great spasms of the lids, where I removed the globe in the afternoon, and the next morning found the other eye open and bright, the patient going home the next morning. The most usual form of sympathetic trouble is malignant iritis, the malignity being caused according to Graefe by the progressive developement of a morbid proliferation on the posterior surface of the iris, a process that causes a total synechia posterior in the true sense of the word, and a complete immovability of the pupil that resists all influence of mydriatics, even at a period when the pupillary field itself is free and vision tolerably satisfactory. This proliferation soon invades the ciliary processes, large veins then frequently being present upon the iris, indicating that the escape of the blood through the ciliary region is impeded. The same cause may interfere with the arterial afflux, and these circumstances added to the retro-iridal proliferation that gradually invades the stroma of the iris, explain the atrophy of the tissue of this membrane. This rigid fibrous tissue explains why on an attempt to make an iridectomy we only succeed in removing fragments of atrophied iris and do not obtain a satisfactory result as regards the vision, nor an arrest of the morbid process.

The injurious tissues, that is the plastic layers, are not only not removed, but the proliferating process is increased by the wound and in particular by the contact of the forceps which pass over the anterior surface of its layers. This sympathetic irrido-cylitis may be characterized by the usual symptoms of severe inflammation, but frequently there are only the slightest symptoms, examples of which we see in children, so that the first thing that attracts the serious attention of parents is the child's blindness. Sympathetic

serous iritis is a less common form and less dangerous than irido-cyclitis.

Three points are to be constantly borne in mind while considering this subject, viz: *that it is as yet impossible to say exactly from what troubles we may fear a sympathetic one in the other eye; however our attention should always be attracted by sensitiveness in the ciliary region, no matter from what causes produced.* Second, *that the danger of sympathetic trouble is not over so long as this sensitiveness remains.* Third, *that foreign bodies lodged in the eye only require time so far as examples now tell us to produce sympathetic trouble.* Lawson gives an instance of a foreign body after seven years producing trouble in the opposite eye; Cowper one after fourteen years. I remember a case in Dr. Williams' practice where the foreign body had lodged twenty years, and I removed an eye in which the foreign body had resided eighteen years.

There are two points to be considered in the treatment, *first, the prevention of the sympathetic trouble; second, the arrest of its progress.*

I think there is no case on record that shows the appearance of sympathetic ophthalmia after the removal of the affected eye, provided the other was perfectly sound. This statement is sufficient then, it seems to me, to indicate the treatment in all cases where the sight of the injured eye is gone, or when there is no hope of its restoration to any useful degree. Of course the advisability being the greater when the injury is one that we know is always sooner or later followed by sympathetic trouble.

We might lay down here the broad general rule *that patients will lose more by the doctors indecision than by anything else.* We are to remember that, once the trouble has begun in the other eye, irreparable damage may result in spite of all we can do; and this brings me to a consideration of the second point, the arrest of the progress or how to act

when once the sympathetic trouble has begun. Our course as regards the injured eye, provided it is hopelessly blind, is always marked out—that is its removal—not so if there remains a greater or less degree of vision in the injured eye, and if the sympathetic inflammation has caused extensive damage. It has been shown by a large numbers of investigators that any interference with the eye while the sympathetic trouble is in progress will hasten instead of retard the progress of the disease.

Then again I shall add a few cases from my own practice where the injured eye finally became the better eye. So then, while according to Graefe, an iridectomy may be made if practised as soon as the true character of the disease manifests itself, no interference should be attempted when the disease is fully established. I have already stated the pathological condition brought about by the inflammation, explaining why any operative interference serves but to aggravate the morbid process. The encouragement we have in waiting till this process becomes arrested, is in the fact that *the atrophy is seldom complete,* quantitative perception of light remaining good; again another point is that the eye may fill up after a good deal of atrophy, by an operation. Acting upon this plan I have had three cases of a good deal of interest, all in children; none of the cases were seen until the sympathetic trouble in the second eye was far advanced; my advice was to wait until the morbid process had stopped. In the first case all irritation had ceased for three months; in second, seven months; in the third a year.

The point I wish to call your attention to in these cases is that the injured eye became finally the better, vision in two of the cases after the final operation, the iridectomy (for I practiced Graefe's method as recommended in those cases of irido-choroiditis, where the pupil is blocked and lymph deposited on posterior surface of iris and on capsula of lens,) was sufficient to enable the patients to get about alone. In the

third I removed the leos, then used the scissors to snip out a portion of the iris and false membrane, but the vision was not brought up enough to allow the patient to get about alone, though there was a greater quantitative perception of light than in the sympathetically affected eye.

I have already spoken of the method of propagation, the ciliary nerves, and Graefe in his article in the archives in 1866, suggested that the source of sympathetic danger might be averted by a division of three nerves, at the point in the ciliary region of the injured eye that remains sensitive to the touch.

Following this suggestion, Dr. Meyer, of Paris, made this division in two cases of sympathetic neurosis, with perfect success. I have practiced the operation once and there has been no return of sensibility, (now two years.) These cases would seem to be sufficient verification of the Professor's theory of the production of the sympathetic ophtalmia. I give a description of the operation as practiced by Dr. Meyer.

The painful spot being found, the conjunctiva immediately over it is raised and snipped, as in the operation for strabismus. The point of the scissors is then used to denude the schlerotic to the extent demanded by the operation; a strabismus hook is then introduced under the straight muscle nearest the incision, so as to firmly fix the eye, one of Graefe's narrow cataract knives is then used to puncture the schlerotic obliquely, parallel with the cornea; the knife is withdrawn and the conjunctiva replaced with a suture and a compressive bandage applied, to facilitate the healing and prevent escape of vitreous which presents in the wound.

REPORT

From New York State Medical Society.

BY R. R. M'ILVAINE, M. D.

REPORT

From New York State Medical Society.

BY R. R. M'ILVAINE, M. D.

MR. PRESIDENT:—At our last annual meeting in June, 1870, I was designated a delegate to the ensuing annual meeting of the Medical Society of the State of New York. In the discharge of this duty I repaired to Albany, Feb. 6, 1871. On my arrival at the capital I was disappointed upon learning that neither credentials nor any of the transactions of our Society had been forwarded, having expected to find those my forerunners, and as I had understood that the Society by a vote had ordered the proceedings to be forwarded. This neglect I regretted exceedingly, as I thought the proceedings of 1870 were more than usually interesting, and would compare favorably with similar volumes of our sister States; and I may add, decidedly the superior of some. Notwithstanding this apparent neglect on our part, all formality was dispensed with, and I was presented by the chairman of the committee of arrangements to the Society, and by the President, in a few brief and well-timed remarks, was welcomed and invited to participate in the proceedings of the body. I replied by thanking him for the courtesy, and congratulated myself on having the honor of being the first to bear the greetings of the profession of the State of Ohio to our brethren of the Empire State. I give a brief history of this Society's progress from the beginning, passing from the

convention system to its present form, and now in the vigor of its manhood had celebrated its twenty-fifth year in 1870.

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All the departments of the Medical Society of the State of New York appeared to great advantage in the personal character of its administrators. The President, Dr. S. Oakley Vanderpool, was an efficient and dignified presiding officer; Dr. Bailey, the Secretary, discharged his functions with zeal and ability; the Chairman of the Committee of Arrangements, Dr. Quackenbush, distinguished for his urbanity and the prompt discharge of his duties. The papers that were read, though not all claiming to be original, had merit, and most of them were valuable contributions to medical literature. The proceedings were marked by decorum and order throughout. The moral machinery all harmonizing, except a slight derangement near the close, which was easily arranged, and the proceedings moved on in their normal grooves.

Notwithstanding their great age and experience compared with our own, the practice of appointing a committee to nominate officers in my opinion is not quite up to the times; for with my democratic instincts I decidedly prefer our own mode. However, with most of the arrangements of the Society I was favorably impressed. I, probably, ought not to say, that as a body it has no peers, but will add, in my opinion, take it all in all, it has no superior in the Union.

At the close, after an able address by the retiring President, Dr. Vanderpool, he gave the profession a princely reception at his own residence, which was attended largely by the distinguished citizens of the capital, with large contributions of the scientific and political dignitaries of State.

The event shall always be a pleasant land-mark in my own history—a "green spot in memory's waste."

All which is respectfully submitted.

R. R. McIlvaine, M. D.

Report of Dr. A. N. Read.

NORWALK, March 25th, 1871.

MR. PRESIDENT AND GENTLEMEN :—Dr. McIlvaine and myself attended the sixty-fourth annual meeting of the Medical Society of the State of New York.

As your delegates we were cordially received. The meeting was held in the city hall in Albany. A large number of delegates were present from all parts of the State, including many of the most distinguished members of the profession. Their admirable plan of organization enabled them to dispatch business with great rapidity. So much was done through committees that irrelevant discussions were avoided. It will take too much of your time if I report upon particular papers that were presented.

Clergymen of the city opened each session with prayer.

Dr. S. Oakley Vanderpool was elected President, and his inaugural address was an able production, and was listened to with marked attention.

The papers read were many of them of great interest.

Thanking you for the opportunity of attending, I am very respectfully, your obedient servant,

A. N. READ.

The Ophthalmoscope and the Sphygmograph in the Study of the Physiological Action of Medicines.

BY ROBERTS BARTHOLOW, A. M., M. D.,

Professor of Materia Medica and Therapeutics in the Medical College of Ohio, etc.

The Ophthalmoscope and the Sphygmograph in the Study of the Physiological Action of Medicines.

BY ROBERTS BARTHOLOW, A. M., M. D.,

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I have to offer for the consideration of the Society some investigations into the actions of remedies studied by a new method. I refer to the conjoint use of the Ophthalmoscope and the Sphygmograph to determine the influence exerted by remedial agents over the circulation. The sphygmograph, it is true, has been employed for this purpose, and I have myself in two prize essays* illustrated by means of this instrument the physiological action of certain remedies; but it has not hitherto been used, so far as I am aware, conjointly with the ophthalmoscope, according to the method which I am about to describe. It is also true that the ophthalmoscope is frequently applied to determine morbid states of the brain; but no systematic effort has thus far been attempted to ascertain by means of this instrument the impression made by remedial agents on the intra-cranial circulation. As the vascular supply to the retina is a diverticulum from that of the brain, morbid states of the latter organ are represented in changes of condition of the former. Spasmodic, tetanic,

*American Medical Association Prize Essay on Atropia; Fiske Fund Prize Essay on Bromides.

and paralytic states of the organic muscular fibre of the cerebral vessels are reproduced in the retina, where they may be leisurely studied by means of the ophthalmoscope. This fact was long known to ophthalmologists before it was generalized in medical practice. Sichel in 1859 first resorted to the ophthalmoscope to diagnosticate intra-cranial lesions. In 1860 Graefe reported several cases in which he had employed this means of diagnosis, and in 1862 Droux published a number of cases which he had observed at the clinic of Desmarres. Liebreich in the first edition of his Atlas of Ophthalmology gave figures illustrative of the changes induced in the retina by intra-cranial diseases. In 1866 there appeared in France two special treatises devoted to ophthalmoscopy in cerebral diseases—one by Bouchut, the other by Galezowski. This subject was introduced to the notice of the profession in this country by a review in the New York Medical Journal of the works above named soon after their appearance in France. Dr. Hughlings Jackson, of London, subsequently, in a paper on ophthalmoscopic diagnosis published in the Ophthalmic Review, directed the attention of English practitioners to this method of research. Thus in a very short time a knowledge of this means of diagnosticating intra-cranial lesions extended from the special realm of ophthalmology to general medical practice, and now an ophthalmoscope is an indispensable appliance for those who make any pretension to accurate investigation of cerebral disorders.

Beside various lesions of the brain, to an accurate knowledge of which we are helped by the use of the ophthalmoscope, certain diseases of remote organs and of the general system are successfully investigated by its aid. I need only refer in this connection to albuminuria, diabetes, and tuberculosis. It would be foreign to my purpose to enter into details in regard to these applications of ophthalmoscopy, or to refer to

the numerous published observations showing the utility of this method of research.

Before proceeding to lay before you the results of my own investigations, which is the immediate object of this paper, it may be desirable to refer briefly to some observations made elsewhere more or less closely related in purpose or scope to mine.

We owe to Dr. Hammond, of New York, the first demonstration of the fact that when galvanic excitation of the sympathetic causes contraction of the intra-cranial vessels, it may be seen by ophthalmoscopic examination, made when the current is passing.* This observation was confirmed in part by Drs. Beard and Rockwell, of New York, by experiments on their own persons, the ophthalmoscopic examination being made by Drs. Roosa, Loring, and Hackley.† Dr. Reuben A. Vance, also of New York, in a recent paper‡ has shown the very important practical applications which may be made of ophthalmoscopy in the treatment of epilepsy. "For the last two years," says Dr. Vance, "I have almost unconsciously fallen into the habit of mentally arranging my patients according to the intraocular appearances observable with the ophthalmoscope. Two well-marked groups can be thus formed: one group characterized by vascular fulness, the other by anæmia of the retina. As the retinal vessels are direct continuations of an important branch given off by the internal carotid within the cranial cavity; as both arteries are supplied by that nerve—the sympathetic—whose function is to regulate the diameter of the vascular trunks to which it is distributed, and whose controlling influence is manifested by an increase in the size of the retinal vessels by

* Spinal Irritation. Journal of Psychological Medicine, April, 1870, p. 259.

† Ibid, July, 1870; also, A Practical Treatise on the Medical and Surgical Uses of Electricity, etc. New York, 1871, p. 277.

‡ The Ophthalmoscope in the Treatment of Epilepsy. The New York Medical Journal, February, 1871.

influences—as emotional activity—competent to increase the quantity of blood within the brain, as well as by the fact that they diminish in size under the operation of medicines which have the power to produce cerebral anæmia—no inference can be more plain to my mind than that, in cases where there is no local disease to affect the vascularity of the eye, the condition of the retinal vessels must be taken as indicative of the blood-supply of the brain. There being nothing about the eyes of the patients, hereafter referred to, which indicated local disease, I concluded that the ophthalmoscopic appearances were, in the one case, due to cerebral congestion, and in the other to cerebral anæmia. In other words, that the efficient cause of the paroxysms was, in one class of cases, an excessive amount of blood circulating through the brain; while in the other cases the opposite condition—the anæmic state—gave rise to the epileptic phenomena."

Dr. Vance bases his therapy on the indications afforded by the ophthalmoscopic appearances. For example: in cases of vascular fulness—cerebral hyperæmia—he employs the bromide of potassium, a remedy which possesses the property to diminish the blood supply to the brain.

So little is known of the essential nature of epilepsy that this attempt to define therapeutical indications by ophthalmoscopy, although exceedingly ingenious, can hardly as yet be considered completely successful. Dr. Vance has, however, not investigated by ophthalmoscopy the actions of remedies themselves, but only the indications for their use as afforded by the state of the retinal circulation in epilepsy.

My own studies have been in a somewhat different direction. I have sought to examine the influence which remedies exert over the circulation by a simultaneous use of the ophthalmoscope for ascertaining the state of the vascular supply to the retina, and of the sphygmograph for determining the arterial tension in general. I have employed for this

purpose the self-illuminating ophthalmoscope of Beale, and the sphygmograph of Marey fitted with the apparatus for determining the spring pressure. Both of these instruments are now exhibited to you. I have to express my obligations to my colleague, Prof. Seely, for valuable aid in the management of the ophthalmoscope, and to my pupil, Mr. Drake, who, animated by a genuine love of scientific investigation, has permitted me to make upon his own person the experiments to be presently detailed.

1. CONSTANT CURRENT.

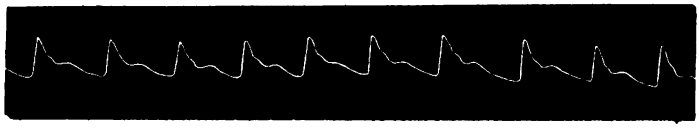
It is now well known that when the superior ganglion of the cervical sympathetic is included within the circuit the following phenomena are observed: slight drowsiness, more or less giddiness, a rise in temperature of the body, perspiration, and if the current be strong, muscular contractions, first described by Remak, and by him called *diplegic contractions.* Hammond observed that the vessels of the retina diminished in size when the current was passing, and Eulenburg and Schmidt* that the pupil under the same circumstances first dilated and afterwards contracted, and that the arterial tension in the carotid was much lowered. The last named observers also noted by the graphic method the changes in the state of the arterial tension.

In order to arrive at some conclusions in regard to the phenomena which follow galvanization of the superior ganglion of the sympathetic, the following experiments were instituted:

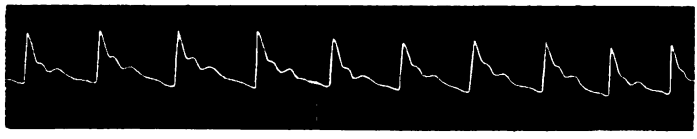
Mr. Drake was placed in a suitable position for the purpose, near a light of fixed intensity, the sphygmograph being *in situ.* Prof. Seely then examined the retina with a Loring's ophthalmoscope, and I took a sphygmographic trace,

*Althaus. Medical Electricity, 2d ed., 1870, p. 254.

the spring pressure being fixed at 200 grammes. The following is the normal trace taken at this time:



After these preliminaries were arranged the positive pole of 15 elements of Smee was placed in the auriculo-maxillary fossa and the negative on the spinous process of the seventh cervical vertebra. During the passage of the current Prof. Seely studied the retinal circulation, and I took the sphygmographic tracing. The ophthalmoscopic examination demonstrated that the papilla became more prominent aud whiter and the vessels less full. The sphygmographic trace presented this remarkable deviation from the normal:

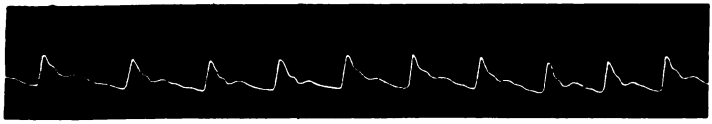


After the giddiness, nausea, and faintness produced by the current had subsided another trace was made, the spring pressure continuing at the same adjustment and Mr. Drake remaining in the same position. It will be at once perceived that this tracing differs in important particulars from that taken during the passage of the current:

In order to ascertain if there were any differences in the action of the current when its direction was reversed, in the

next experiment the negative electrode of 15 of Smee's elements was placed in the auriculo-maxillary fossa, and the positive over the spinous process of the seventh cervical vertebra. Mr. Drake's subjective sensations were the same under these circumstances as in the former experiment. The sphygmographic trace, as will be seen, exhibits some slight differences:

In fifteen minutes after the electrodes were withdrawn the trace was as follows:



During the passage of the current in the experiment just detailed, Prof. Seely's ophthalmoscopic examination disclosed diminished vascular supply to the retina, prominence of the papilla, but more fulness of the veins than he had observed in the other examination. In fifteen minutes after the current had been applied, Prof. Seely examined again with the ophthalmoscope, and ascertained that the influence of the current on the retinal circulation had not ceased—that the distinctness of the papilla and the diminished blood supply remained, with some slight modification, as during the experiment.

Any one familiar with the graphic method of registering the circulation movements will be struck, on examination of these tracings, with the great differences in the arterial tension which they exhibit. When the current is passing

through the neck, including in the circuit the sympathetic ganglia, the pneumogastric nerve, and the carotid artery, a marked diminution in the tension of the radial artery takes place. The evidence of this is seen in the increased amplitude of the pulse wave, in the abruptness of the ascent, in the sharpness of the summit, in the rapid and sudden descent, and in the double dicrotic movement. How shall we reconcile this fact with the diminished blood supply to the retina, as shown on ophthalmoscopic examination? Hammond attributes the anæmia of the retina produced in this way to the galvanic excitation of the sympathetic, and the consequent contraction of the organic muscular fibre of the retinal vessels. But the state of the arterial tension shows, I think, that this can hardly be the true explanation. The excitation of the pneumogastric, and the consequent *slowing* of the heart's action and lowering of arterial tension, it seems to me explain the phenomena more correctly. The giddiness and vertigo and drowsiness experienced when the current is passing are probably due to the same cause, which acts by diminishing not only the amount of blood sent to the brain, but also its rate of movement in the cerebral vessels. In a short time after the current is broken, as the sphygmographic trace clearly exhibits, there takes place a considerable rise in the arterial tension. This result is probably due to the excitation of the sympathetic. It is well known that galvanization or other irritation of the sympathetic induces action which is propagated very slowly from the point of irritation, and by a series of regular and orderly movements.

That these explanations which I have ventured to give in regard to the action of the constant current, when the sympathetic and the pneumogastric are included in the circuit,

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NOTE.—In the examination of these sphygmographic tracings, taken whilst Mr. Drake was under the influence of the constant current, it must be understood that the minor irregularities of the pulse wave are due to mental disturbance.

are the true ones, appears probable from some recent researches by Bert* and Waller.† The eminent physiologist last named has very clearly set forth the phenomena induced by pressure on the pneumogastric nerve. He thus describes them:

"In most cases the first indication of our compressing the nerve itself, is a sensation of a want of air. followed by a deep and laborious respiration. * * * At the same time that the respiration is thus affected, the heart's action becomes much disturbed and its rhythm altered, being weakened and irregular, although somewhat accelerated. * * * A continuance of the pressure at the neck, after producing the above symptoms, soon causes a retardation of the heart's action to the amount of five or six pulsations in a minute. These motor effects on the heart are frequently accompanied by a certain degree of uneasiness and sense of sinking over the præcordial region."

A close correspondence it is evident exists in the symptoms caused by mechanical irritation of the pneumogastric, and galvanic excitation by the application of an electrode to the auriculo-maxillary fossa. The phenomena, then, which follow the so-called "galvanization of the sympathetic" are not solely due to the fact that the superior ganglion is included in the circuit, but in part to the excitation of the *par vagum.*

2. ALCOHOL.

In order to determine the influence of alcohol over the retinal circulation, Mr. Drake took a quantity of wine equal to three and a half ounces of absolute alcohol. His normal sphygmographic trace at this time was the following:

*Archives de Physiologie, No. 3, 1869.
† The Practitioner, Vol. 4, p. 298.

When the influence of the alcohol had reached its maximum, the annexed trace (No. 7) was taken:

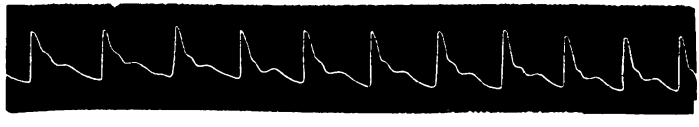
The change here seen consists in an increase of the cardiac pulsations and a slight lowering of the arterial tension.

The ophthalmoscopic examination was made by means of a Beale's self-illuminating ophthalmoscope. The condition of the retina in the normal state had been previously carefully studied, so that it could be compared with that produced by alcohol. The change consisted in increased distension of the vessels, especially veins, previously visible, and a general augmentation of the vascularity, and also less definition of the papilla.

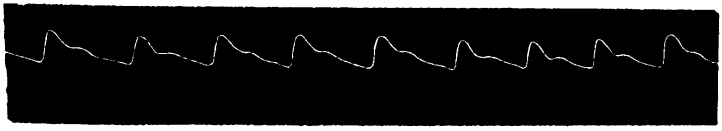
We recognize here the influence of two factors: relaxation of the organic muscular fibre of the arterioles and increased action of the heart, so that a larger amount of blood in a given time was thrown into the brain, and as a necessary consequence, owing to the relaxation of their walls, a fuller condition of the vessels.

3. ATROPIA.

In the study of atropia the method of proceeding was the same as that detailed under "alcohol," except that the remedy was administered by subcutaneous injection. The sphygmographic trace was taken before the injection was practised, with the following result:



The instrument remaining *in situ* with the same spring pressure, $\frac{1}{48}$th of a grain of sulphate of atropia was injected under the skin of the arm, when trace No. 9 was made.



What is most striking in this, is the remarkable rise in the arterial tension. The ophthalmoscopic examination showed considerable diminution in the size of the vessels, diminished vascularity, and more marked definition of the papilla, as compared with the normal. It will be seen on comparison of the tracings that a considerable slowing of the cardiac pulsations took place when the influence of the atropia began. I have elsewhere shown that this retardation of the heart is the first effect of this agent, but the duration of this slow stage is short, being quickly succeeded by a decided increase of the number of pulsations. In the action of atropia on Mr. Drake, at least as regards the prolongation of the slow stage, we have an instance of idiosyncracy. The lessened number of heart-beats and the sudden rise of arterial tension explain the marked anæmia of the retina. Probably if ophthalmoscopy had been practised some hours later, a different condition of the retinal circulation might have been observed.

4. MORPHIA.

In a half-hour after one-fourth of a grain of sulphate of morphia had been injected subcutaneously, the following trace (No. 10) was taken from the right radial:

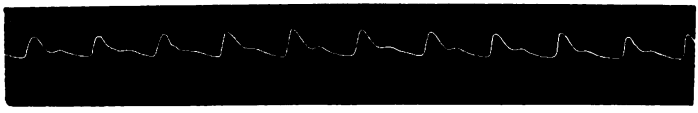
If this be compared with Mr. Drake's normal sphygmographic trace two deviations will be at once noted: 1, the increased number of heart-beats; and, 2, the remarkable rise in the arterial tension. In respect to the rise of tension, it will be perceived that it is even greater than that caused by atropia. On making the ophthalmoscopic examination I was surprised to observe a considerable increase in the vascularity of the retina; both arteries and veins were fuller, and the papilla were blurred. If this observation had been made with atropia, it would have been considered quite in accord with the physiological action of this agent, for a rise in the heart-beat and in the arterial tension occurs coincidently. It will be remembered, however, that atropia in Mr. Drake slows the heart at the same time that it elevates the tension. On the other hand, morphia remarkably raised the tension and increased the heart-beat, and hence the congestion of the retina which followed its subcutaneous use must have been due to both factors. The anæmia of the retina caused by atropia must, therefore, have been produced by the rise in tension and the prolonged slowing of the heart's action. Some observations by Harley on the flushing of the skin caused by atropia, may be quoted in illustration of this view. This observer has shown that the flush is a result of two causes acting simultaneously, viz: the rise in tension of the arterioles, and the increased *vis-a-tergo.*

These facts clearly indicate the great importance of ascertaining the state of the arterial tension before coming to any conclusion from ophthalmoscopic examination of the retinal circulation.

5. BROMIDE OF POTASSIUM.

In the study of the physiological action of a remedy which, like bromide of potassium, does not produce marked phenomena when given in ordinary medicinal doses, it is necessary to employ the largest amount which may be toler-

ated by the stomach. In six hours Mr. Drake received four drachms of the bromide, when the annexed tracing (No. 11) was taken:



As compared with the normal, we notice that the ascent of the wave is slightly oblique, the summit rounded, the descent gradual, and the dicrotism very slight—qualities indicating a much higher degree of arterial tension. With this obvious rise in tension, there occurs more or less slowing of the heart-beat—conditions of the circulation which should be indicated in the retina by ophthalmoscopy. Such I ascertained to be the fact. The vessels of the retina, both arteries and veins, were seen to contain less blood than normal, and the papilla was better defined. Dr. Vance's study of the retinal circulation in epileptics, as a basis for rational therapy, seems to me, therefore, as regards the use of the bromide of potassium, an important step in the right direction.

CONCLUSIONS.

Very important aid to exact knowledge of the physiological action of remedial agents may be obtained by an ophthalmoscopic examination of the retinal circulation.

To avoid erroneous conclusions from such examinations, the state of the arterial tension in general should be determined at the same time by the sphygmograph.

Ophthalmoscopy will furnish us more precise indications for the treatment of cerebral disorders than has heretofore been attainable.

Ophthalmoscopy will enable us to use medicines that exert an influence over the circulation with more definite aim, and

with a nicer appreciation of their real therapeutical influence, than by the coarser methods now employed.

NOTE.—In a very thorough and exhaustive paper "On the Action of the Eyelids in Determination of Blood from Expiratory Effort," Donders has examined several physiological questions, briefly referred to in the preceding pages. He thus alludes to the relation of the retinal to the intra-cranial circulation: "The circulation in the orbit must thus be governed by that in the cranium, of which it makes almost an integral part; and in examining the influence of expiratory pressure on the retro-ocular vessels, the circulation in the brain, therefore, cannot be a matter of indifference." "On the one side they (the veins of the orbit) are connected with the sinus cavernosus, partly also with the vena ophthalmo-meningea of Hyrtl, on the other side with the vena facialis anterior. Now, in my opinion, the blood in general flows into the sinus cavernosus, in order to leave the cranium by the internal jugular vein."

As the brain rises and falls with the respiration movements, so corresponding movements of the eye-ball take place and can be recognized. "The conclusion is," says Donders, "that the intra-ocular vessels are in more than one mode protected against sudden dilatation, but that, nevertheless, particularly in man, the influence of persistent expiratory pressure on the veins is distinctly recognizable."—*Archives of Medicine, Vol. V., p.* 20, *et seq.*

REPRODUCTION.

BY JAS. T. WHITTAKER, A. M., M. D.,

Professor Physiology in the Medical College of Ohio, etc.

Experiments in Reproduction.

BY JAS. T. WHITTAKER, A. M., M. D.,

Prof. Physiology in the Medical College of Ohio, etc.

Questions concerning the conservation of the race are of tantamount if not paramount importance to questions concerning the preservation of the individual.

I have the honor to present to the Society the results of some original investigations in the function of generation. In the Cincinnati Medical Repertory of last January, I published the details of a melancholy case of dysmenorrhea and sterility from retro and right latero-flection of the uterus with cervical hypertrophy and occlusion. The constriction was fully relieved with Peaslee's uterine dilators and tents, and the dislocated fundus restored to its normal position by the same means, aided by occasional repositions with the uterine sound. At my patient's earnest desire, the operation of ablation of a portion of the cervix was temporarily deferred. The two following notes are abstracted from the paper itself.

"On November 15th., (three days after the time for menstruation), her husband presented himself with the joyful intelligence that this period had arrived and passed without a show of neuses; moreover, that his wife had or fancied mammary symptoms, and certainly on two occasions experienced morning nausea. From this time on to the present, Dec. 10th, when the second period came and went and 'left

no sign,' the probabilities of pregnancy have steadily increased. Her general condition has most decidedly improved; her weight has gained at least ten pounds, and her mental amelioration (she had became partly insane on the subject) is not to be measured by avoirdupois."

On propose, Dieu dispose. Scarcely a week had elapsed, my corrected proof was but just returned to press, when I was summoned in haste to attend what was considered an abortion. The third period had passed a few days ago; she had observed the greatest care at this time but just after it, considering herself safe, she had "sprained her back," in her own language, in lifting a heavy box, and, to continue her story, "immediately became sick." Several large clots had passed and were lost before my arrival. As nothing of "complex" appearance had presented in any subsequent discharge it was considered a case of miscarriage; ovum lost. Subsequent recovery was complete.

Two days before the February epoch I succeeded in inducing both parties to permit an attempt at artificial impregnation. The period immediately preceding menstruation was selected in accordance with the views of Raciborski, who regards this as the time most favorable for fecundation. The justification for the attempt was found in the *elongatio colli* which Sims, Beigel and Virchow, all regard as sufficient cause of sterility.

The method employed by Girault in 1839, (Etude sur la generation artificielle dans l'espece humaine, Paris, 1860) as afterwards modified by Gautier (De la fecondation artificielle dans le regne animal et de son emploi contre la sterilite, Paris 1870), was adopted in this case.*

About one drachm of semen, *de coitu*, was injected into a previously warmed, hollow uterine sound. This was easily

*I may state here, parenthetically, that Hunter and several German experimenters had long before induced impregnation in the lower animals by intravaginal injection.

carried to the fundus, when a rubber tube with a glass mouth piece was attached to its external extremity and the contents of the tube were slowly forced into the uterine cavity by insufflation. A small cotton tampon was then placed at the external os to block its escape. The non-appearance of the menses at the proper time again gave promise of success, an illusion in turn dissipated by their reappearance a week later. It now occurred to me that the difficulty might be on the other side. This suspicion received full confirmation on microscopic examination of the semen, as not a single spermatozoid could be detected in any part of the specimen presented on the following day.

I was not unaware of the fact promulgated by Godard and Liegeois, that spermatozoids are always diminished or absent after repeated venery. In the second of a series of articles published by the last named distinguished author on the condition of the seminal section in disease, (Medical Times and Gazette, 1869,) is recorded the case of a student who had indulged in three or four connexions daily, for ten or twelve days successively. No spermatozoids were found in seven or eight preparations; there was no lesion of the testicles. Another specimen examined after some months abstinence showed the semen crowded with zoosperms.

Accordingly, I subjected another specimen after two weeks abstinence to microscopic examination. The semen was void of fecundating elements.*

How was this condition to be explained? It has long been known that age does not deprive semen of its characteristics of potency. Dupley, Dieu, Casper, Mantegazza, and Curling, have all found spermatozoids at 60, 70, 80, 90, even 96. This fact is mentioned only in passing as age could not enter as an element in my case. The individual was but 45.

It is also well known that cryptorchids, whether effemi-

*Two subsequent examinations fully confirmed the permanent absence of spermatozoids.

nate (as in the cases of Godard, "Sur les Monorchidie et Cryptorchidie) or virile, as far as appearance and erectile potence are concerned (Liegeois, loc. cit.,) though furnishing semen apparently normal, lack these sole elements of vivification. My case was neither one of cryptorchism nor monorchism; both testicles were in normal situ.

Acute constitutional disease in any form does not influence their presence in potency, except in age. Chronic disease, as advanced phthisis, on the authority of Davy, Ruyer, Curling, Godard, Gosselin, and others, unquestionably does. I have myself verified this in two cases of advanced phthisis treated at the College dispensary. One of these individuals had never begotten, the other was the father of two children, early in marriage and in his disease. One of the two children is likewise a patient at the Dispensary with its father's malady. The examination of the semen showed absence of spermatozoids in both cases. The individual under present discussion is in perfect health.

Double syphilitic orchitis, tubercle, fatty and fibrous degeneration or other diseases of the parenchyma by affecting the epithelium of the seminal tubules, and consequently preventing their formation; bilateral epididymitis, even a hernial pad in some cases by occluding the calibre of the excretory ducts, and consequently preventing their escape, all furnish semen, azoospermatic. None of these conditions existed nor had ever existed here.

Workers in lead, as type setters, &c., are often infertile, "perhaps by degeneration of the semen," (Benedict, Handbuch der Elektrotherapie.) Such was not and never had been his avocation.

In short, all the known causes in explanation of this anomalous condition were absent. My patient, for such he became, was a man in sound physical condition, in the prime of life, and of temperate, even abstemious habits. It was a case of the character of those described by Godard, Cas-

per, Hirtz, Mantegazza, and Gosselin, individuals in perfect health, with active sexual desire, perfect erectile potence, full ejaculation, and yet absence of spermatozoids.

Liegeois, from whom many of these points are taken, casts doubt, it is true, upon many of these cases. He contends that they were examined after death and after the seminal ejaculation, so frequent at this time, which empties the seminal tubules and vesicles of their contents and leaves a fluid of perhaps cadaveic exudation for examination. He adds, moreover, that of seventy-two cases he has found but one instance of azoospermia.

The statement of Hirtz, however, is too clear and explicit in this regard to be subject to discredit. He publishes the history of two robust men with genitals intact. They had been married several years and were childless. Coition was always perfectly normal, performed with even more than ordinary vigor, and yet there were no traces of spermatozoids. It is noticed as remarkable that "their ejaculations were never followed by the fatigue of physiological action." (This is not the case in my patient.) "Sterility here," concludes Hirtz, "is idiopathic."

Thus was my attention diverted from my patient to her husband. Nor had I any cause to suffer compunctions on my patient's account; the dysmenorrhea which had been so distressing a symptom during her whole married life, ceased completely and permanently with the cervical dilatation, as it usually does when the cause is as here of wholly mechanical nature.

As little regret was to be experienced for the attempt at artificial impregnation. The history of the case as recorded, exhibits an instance in full confirmation of the statement of Raciborski, that "conception is an absolute necessity to the welfare of certain organisms." The success of the manoeuver has been incontestably established by scientific experiment and clinical experience. Girault (supra cit.,) reports

nine successful cases in twelve attempts. Gipon, Lesuer and Delaporte, all report cases of success. (Reform Medicale, Aug. 18th and 27th, from Schmidt's Yahrbucher, Sept. 1870.) Sims, as is well known, reports cases of success. Gautier (sup. cit.) reports fifteen successful cases, and all executed without the least injury to the female.*

Had I not been checked by my discovery of the condition of the semen, which in truth should have been previously ascertained, I should have persisted in the attempt after, as well as before, menstruation, as there are still eminent authorities (Pouchet, Meyer,) who are in doubt as to the most appropriate time.

As it is, I shall institute treatment with particularly the constant current of electricity through the testicles in the hope of restoring or endowing this organ with its proper physiological function. I have already translated an article on impotence from Benedikt (loc. cit.) wherein the curative effects of this agent in aggravated conditions of this affection are fully set forth; whether or not its efficacy extends to cases of this nature remains to be seen. The fact that ovulation in the female has been excited or reinstated under this treatment is an analogy of promise.†

I may remark before leaving this part of my theme that I have since had two cases of dysmenorrhea and sterility from occlusion of the external os where occlusion in general most frequently exists. (Sidney.) In both cases the dysmenorrhea was perfectly relieved by the treatment adopted in the case of the text; artificial impregnation was, however, not permitted.

*The results in all these cases with the attending physical and mental relief afforded is the best answer to the silly and flippant criticisms which have been entered upon this method here as elsewhere. The man who is incapable of totally disregarding "disgusting details," in the accomplishment of cure in any way, has made a lifetime mistake in selecting the avocation of a physician.

†May 17th, 1871—A careful examination of the fresh secretion to-day, after four weeks treatment with ten elements of the Siemens and Halska's Battery (three times a week,) and four weeks perfect abstinence from marital intercourse exhibits no change whatever in its character or constitution.

The author has lately commenced the study of the semen of man and some of the lower animals, by direct experimentation upon the sole elements of vivification in this secretion, viz: the spermatozoids. The elaborate investigations of Godard, Donne, and Liegeois have been made the basis of study and then the field was widened by a series of new experiments.

The direct effects of the following agents have been cursorily investigated; different grades of temperature, powerful poisons, strychnia, hydro-cyanic acid, arsenic, digitalin, veratrin and the bichloride of mercury; the narcotics, morphia and atropia; the astringents, tannin and the sulphate of zinc, aphrodisiacs with phosphorus at the head, so called alteratives which are known to exercise a direct effect on the testicle itself, as the iodide of potassium, coloring matters, indigo, aniline and carmine, the acids and the various normal and pathological secretions of the generative passages themselves.

The influence of many of these agents has already been thoroughly investigated and described by previous observers so that ours was in these cases a labor of mere repetition. Wherein, by more perfect means of study, with recent mechanical appliances previous observations have been extended, we propose to detail when the whole series of experiments shall have been complete.

The object of the present paper is to call attention to the action of two agencies, experiments in which have yielded results so uniform and positive as to justify what might otherwise seem an immature publication. These are agencies of directly opposite effect; electricity on the one hand and carbolic acid on the other.*

*I may state that the secretion in most instances was obtained from the rabbit, either after copulation or after death by strangulation. In such case there is always a full emissio seminis just before or at the time of death. This fact has long ago been observed in man executed by hanging. Opportunity has been afforded in the case of an individual treated for impotence, and in the case of a syphilitic patient in private practice of fully confirming the action of these two agents in man.

That the sole impregnating power in semen exists in the spermatozoids, the searching experiments of Prevost and Dumas, Coste, Barry and Bischoff, leave no shadow of doubt. That contact of the semen and ovum is absolutely essential to fecundation is as well established and accepted from the experiments of Spallanzani, Prevost and Dumas, Haighton, Coste, etc. That this contact of the sperm with the germ cell is effected by the inherent motility of the spermatozoid we also know as well from the more recent investigations of Kolliker and Robin. These observers have discovered spermatozoids all along the internal generative passages to the ovary and even in the act of penetrating the now softened vitelline membrane of the ovum itself.

That, moreover, each drop of healthy semen contains in the average about two hundred spermatozoids of which at least three or four are necessary to fecundation (in the frog) and that the activity and duration of their motion is in direct correspondence to the vitality and virility of the individual, are all facts of general acceptance.

I beg the indulgence of the Society for the necessity of repeating facts so well established and widely known.*

Being admitted that their transit to their destination is principally effected by their own motile power, it is clear that if this property be lost or destroyed fecundating power ceases.

"Are we authorized to affirm," asks Liegeois, "from the presence of spermatozoa that the person furnishing them is fruitful? No! There still remains to be seen if these

*It is an interesting fact in their history that they were first discovered by Louis Hammer, a young German student of medicine at Leyden, in 1677.

The wonderful, seemingly instructive, nature of their movements as well their varieties of configuration, etc., being fully chronicled need no mention here. The rapidity of their motion has been estimated by Henle at about one inch in eight minutes.

I may mention, too, merely for its interest, the tendency of modern investigators to refer the transmission of hereditary qualities to the molecular arrangement of their atomic constitution. Physiologists are forced to this conclusion as nothing can be gleaned from the variations of form, size, or other properties of their homogeneous structure.

elements are endowed with motion. Godard states that in some sterile individuals this movement is totally absent."

Exception might be taken here that semen is sometimes intro-mitted, *per saltum*, directly into the uterus, (Hunter, Ruysch, Haller,) and there encounters the ovum at once. This objection is met by the fact that it is just at this moment of contact that motion is most necessary, for as we have seen, it is by means of it, that penetration is effected.

We know that this motion persists in utero a very long time, much longer than out of the body. In the majority of cases the spermatozoid does not engage in the cervix for half an hour after intromission and then ten or twelve hours are requisite to reach the ovary, should the necessity exist for such a distance of travel. Prevost and Dumas have seen them living and moving in bitches seven days after coition, and Bischoff in the rabbit even eight days thereafter. Girault claims persistence of vitality for forty hours in the human uterus. Kraus, the latest investigator on this subject, informs us that they perish at once in utero without the prostatic fluid, with it, they live for 36 hours.

That this motility is increased by rendering the fluid containing them more fluid is only in accordance with the laws of simple mechanics. We observe them move slowly and with apparent effort when crowded in mass in the fluid of the vas deferens; a drop of blood serum added, they luxuriate, as it were, in their freedom.

I refrain at present from mentioning the action of the various agencies enumerated, upon their vitality and vivacity. I may state in general terms that hitherto there has been discovered no means of promptly and permanently arresting their movements except high or low degrees of temperature, powerful poisons or disorganizing substances.

I am not unmindful of various modern researches showing the destructive action of pathological secretions of different portions of the generative tract. We know that women

with most acrid discharges of every reaction do occasionally conceive. Conception occurs, too, in spite of cold and acid injections, tampons, cundums, premature withdrawal, coition at intervals of menstruation, and all the other means resorted to, usually with sinister design: means which are nearly all unquestionably attended with evil effects, particularly upon the female organism, though scarcely with the absurdly exaggerated consequences so unctiously detailed in our flood of recent literature upon this subject. Corrosive sublimate, however feeble the solution, arrests motion promptly, but the contact of this substance, unless used in dangerous quantity, can never be made complete.

Carbolic acid in full strength not only kills spermatozoids but destroys them, leaving under the microscope but a mass of transparent globules of irregular (polygonal) outline and various size; masses of complete and permanent coagulation. The acid rapidly advances in an irregular wall, beading, separating and destroying the zoosperm within its limits in a few seconds. The extra mural filaments remain motionless, as at once arrested, until more acid be added, when they too disappear.

In even a weak solution with glycerine, (glycerine is the best vehicle as it most rapidly permeates the exceedingly tenacious and resisting prostatic fluid,) it will speedlly arrest motion. A strong solution of the concentrated acid blurs the field completely; the vapor alone is sufficient to this effect. In a very short time after the vapor of the acid comes in full contact with the drop, the field begins to grow cloudy, the motion of the zoosperm more and more feeble until complete cessation, which always occurs within five minutes.*

*These observations were made by suspending the drop of semen from the under side of the covering glass supported upon a dough or putty ring. By thus avoiding pressure, motion is maintained for a much longer time. The stage of the microscope is of course kept at about 98° F. In studying the action of electricity, the tin foil strips of Burdon Sanderson were employed.

I am hapy to have had the sanction of the presence and confirmation of my friend, Dr. Dodge, in these investigations.

Is this arrest of motion permanent, or is it like that of cold or congelation, but temporary? May not reanimation occur?

Two experiments satisfy us upon this point. It is well known that the stimulus of electricity is a near approach to the stimulus of vitality. If electricity in the interrupted current be sent through a drop of semen, the spermatozoids are speedily killed by shock. If the constant current be used only those at the positive pole are destroyed. This is from the development of acid at this pole. If now the current be constantly changed by continually reversing the poles this development of acid is apparently prevented and the spermatozoid is made to experience the stimulus, simulating that of vitality. Their motions are increased and prolonged. Moreover, motion is resumed for a short time in those recently quiet.

If, however, carbolic acid be previously brought in contact with the drop, the electric current has no effect. In the expressive language of Burdon Sanderson, in describing the action of electricity on the white blood corpuscle after repeated stimulation, "There is no movement. It is death."

A second experiment yields results even more conclusive. Through an improvised vaginal speculum, a pipe stem, a current of carbolic acid vapor is entered in a rabbit an hour and a half after copulation. On section, not a single living spermatozoid could be detected.

How is this death effected? Carbolic acid, as is well known, has the property of coagulating albumen. It is indeed the most delicate test for albumen which we possess, denoting it in urine even when its presence is so small as to escape detection by heat or nitric acid. Prager Viertel Jahrschrift, 1870, p. 5.

Is then the arrest of motion to be ascribed to coagulation and mere mechanical hindrance?

I find the solution of this question so fully met in the

celebrated report of the Cattle Plague Commissioners that I may be pardoned the following quotation from Mr. Crookes: "The powerful action which carbolic acid exerts on the phenomena of life is the most remarkable property which it possesses. It may be looked upon as the test proper for distinguishing vital from purely physical phenomena; in most cases its action is characterized by the certainty and definiteness of a chemical reagent." He adds then in language which from the conclusions of these experiments seems almost like the light of prescience, "In the presence of carbolic acid, the development of embryonic life is impossible; and before its powerful influence all minute forms of animal life must inevitably perish."

"The vapor of the acid," I cite from an elaborate paper on Carbolic Acid, its Therapeutic Action and Uses, read before the Ohio State Medical Society at its last convention, by my friend and colleague Prof. P. S. Conner, "is destructive to the life of small animals, (those not larger than mice,) and in larger animals death may be produced by injecting into the veins a saturated aqueous solution, in which case, the only apparent change in the blood consists in the *immobility* of the globules.

And again, from the same source, "The volatility of the agent insures the destruction of minute living organisms with which the acid in mass is not in immediate contact, as has been most conclusively established, and its destructive action, whether in mass or in vapor, is not in virtue of any oxidizing or deoxidizing power it may possess, nor in consequence of its coagulation of albumen or of its causticity, but is solely due to the fatal influence of the acid upon vitality." It arrests motion, to use the term invented for it by Angus Smith, by its "colitic" action.

I forbear from making any practical applications of this discovery. The question of the limitation of offspring is a question of sociology and political economy. I am content to present the bare scientific fact.

On the Prevailing Diseases of the State.

BY DR. J. R. BLACK.

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During February last, circulars containing the enquiries given below. were sent to seventy-seven counties of the State, respectfully asking information concerning the diseases prevalent in each county during the past year, with the request to return to the chairman's address before the 15th of March, 1871. These circulars were, with one or two exceptions, sent to members of this society, from whom there rightfully might be expected some interest and desire to promote the objects which your committee has sought to discharge.

The counties of Coshocton, Defiance, Fayette, Gallia, Jackson, Mercer, Noble, Paulding, Pike, Williams, and Wood have no living representative in this organization ; and hence, with the exception of Coshocton, the address of any of their physicians could not be obtained.

Of the 82 circulars sent, only 28 were returned, from which it is, of course, impossible to make a full and satisfactory report upon the geographical distribution of diseases and their causes in our State. Still, what has been received is not without interest and value, and such as it is, is submitted to you.

The first inquiry was in reference to the prevalence of endemic, or epidemic diseases, from Feb. 1st, 1870, up to

Feb. 1st, 1871; and if any, the form, type, degree of prevalence, probable cause, and time of occurrence.

By dividing the State into western, eastern, northern, southern, and central positions, the east and south hilly, the west and north nearly level, and the central undulating, our minds will be materially assisted in arriving at some conception of the relation of diseases to topography.

Upon the hilly east, there are reports from only three counties—Mahoning, Monroe and Belmont; and only in Mahoning was there any endemic or epidemic. Dr. McCurdy reports an epidemic of scarlatina and diptheria there which began in October, 1870. Upon the south, composed of Scioto, Lawrence, Warren, Ross, Brown, and Hamilton, Dr. Finch, of Scioto, reports an unusual prevalence of malarial fevers, (even on uplands where not usually seen), and decidedly pernicious. In Warren Dr. Scoville says diptheria became epidemic toward the close of last year—type mild, and continued throughout the winter. There was, also, in various parts of the county, typhoid endemics, quite malignant, with more tendency than usual toward inflammatory complications, which seemed to be prevented, in many cases, by hemorrhage from the bowels.

Dr. Franklin, of Ross, reports intermittent and remittent more prevalent and severe than for thirty years, and caused by the unusual exposure of stream and pool beds.

On the west, or in the counties of Champaign, Van Wert, Darke, Auglaize, Shelby and Putnam, Dr. Longworth, of Van Wert, and Dr. Steely, of Shelby, report less malarious disease than ordinary, owing to the dry weather, while on the other hand Dr. Matchett, of Darke, reports malarious disease endemic the whole year. Dr. Berlin, of Auglaize, says dysentery was epidemic there in August and September, mortality about 40 per cent.

In Putnam county Dr. Beardsly reports an endemic of typhus, originated from emigrants and affecting only those

exposed to it, such as nurses and visitors. The Dr. treated ten cases, two deaths, success of colleagues the same.

Upon the north, or in the counties of Crawford, Fulton, Cuyahoga, Lorain, Huron, Erie and Lucas, Dr. Jenner, of Crestline, Dr. Bishop, of Fulton, Dr. Allen, of Lorain, Dr. McGuire, of Huron, and Dr. Agard, of Erie, report unusual health, and freedom from endemic and epidemics, while Dr. Herrick, of Cleveland, and Dr. Ridenhour, of Toledo, report malarial fevers unusually prevalent in August and September, also, epidemics of scarlatina.

In the central counties of Licking, Marion, Fairfield, Madison and Coshocton, only Madison, Dr. Beach reports more malignant fevers than ordinary. Dr. Boerstler, of Fairfield, reports an epidemic of varioloid; twenty-eight cases, one death; and also, like Licking and Madison, a mild epidemic of scarlet fever, anginose variety.

To the inquiry, was there any unusual peculiarity of disease, and if so, what, and the probable cause? the following answers were received. On the east there was, last year, no unusual forms of disease, while on the west, Dr. Matchett, of Darke, mentions an unusual prevalence of whitlows, thecal and palmar, with a tendency to suppuration from slight causes; and Dr. Beardsley, of Putnam, reports that children between one and three years of age were frequently and suddenly attacked while in perfect health, with hemorrhage from the bowels, of from half to two ounces; liable to recur several times, attended by prostration, anorexia, thirst and vomiting. Evening temperature 103° to 104°, morning, 102° to 103°, pulse 120; duration eight days; cause malaria. The open winter produced more chills and fever than usual.

Upon the south Dr. Wilson reports the unusual prevalence during November, December, and January of laryngitis, among young and old. To the north Dr. Jenner, of Crawford, reports an unusual prevalence of throat disease with a marked tendency to diptheria. Dr. Herrick, of Cleveland,

a greater tendency than ordinary to a low or typhoid type in disease. Dr. Agard, of Erie, writes that during the spring and summer of last year, with the great prevalence of malarious fevers there was more gastric and intestinal disturbance than usual, and during the autumn, the fever manifested a tendency to pass into the continued form with exacerbations and profuse sweats coming on at irregular intervals.

In the central counties, Dr. Mouser mentions an absence in susceptibility of the system to the action of mercurials.

The third inquiry as to the prevalence of typhoid fever, the number of cases and deaths, and its cause, brought the following replies. In the eastern counties, Mahoning and Monroe had a few mild cases, and Dr. Shouse, of Belmont, returns forty-five cases with three deaths.

In the western counties Dr. Longworth, of Van Wert, returns fifteen cases, one death, hemorrhage of the bowels more common than usual, and disease propagated by stools of typhoid persons; Dr. Matchett, of Darke, reports twelve cases, two deaths; Dr. Steely, of Shelby, twenty cases, no deaths; Dr. Beardsley, of Putnam, says they had typhoid in a mild form, in August, September, and November, from bad water, imperfect filteration, bad drainage, and non-contagious.

To the south, Dr. Finch, of Scioto, returns six malignant cases with four deaths; Warren nine cases, two deaths under care of Dr. Scoville, cause zymotic, prevailed sporadically over the country. Ross, Brown and Hamilton report very little of this fever, and Dr. Wilson did not meet with a case in Lawrence.

On the north Dr. Jenner, of Crawford, reports twenty-five cases, no deaths; Dr. Allen, of Lorain, three cases, one death; Fulton, Huron, Seneca, Erie and Lucas had each a very few and mild cases. In Cleveland there was no in-

crease over previous years where it always prevails to a considerable extent.

In the central counties Dr. Boestler, of Fairfield, reports this fever was more prevalent than ever before known; deaths one in seven; time, November and December. Coshocton reports two fatal cases originating in a damp, unventilated cellar; Dr. Beach, of Madison, reports five cases, one death; originating in Central college, Franklin county. Marion county reports five cases, one death; Licking county three cases two deaths.

To the fourth inquiry as to the prevalence and causes of spotted fever, only Warren, Van Wert and Crawford report each a few cases, and in each a mild form, all recovering, one with blindness; cause unknown.

In response to the fifth inquiry, in reference to diptheria, its grade, number of cases, and deaths, Lucas, Marion, Auglaize, Van Wert, Belmont, Ross, Shelby and Licking report none, while Fairfield, Lorain, Erie, Darke, Seneca, Huron, Putnam, Champaign, Lawrence and Scioto report its mild prevalence in sporadic form. Dr. Beach, of Madison, reports twenty-five cases in November and December, with no deaths. Quinine employed with best results. Dr. Harris, of Coshocton, had about twenty cases with one death. In Mahoning it prevailed severely, seventy-five cases reported with a mortality of five per cent. Dr. Scoville treated fifty cases, no deaths, with tannic acid locally; iron and chlo. potassa internally. In Monroe Dr. Shouse says it prevailed during fall and winter with a few deaths. Dr. Hall, of Brown, reports twenty-one cases, five deaths, and Dr. Herrick, of Cleveland, forty cases, no deaths.

In reference to scarlet fever—the following counties had it mildly. In Lucas it prevailed for fifteen months, mortality small. Lorain, Ross, Madison, few and mild cases. Erie had a good deal of it, though mild—so much so as to almost escape attention, till called to treat sequilæ; Darke twenty-

four cases, one death; Marion anginose variety, several deaths. Dr. McFarlan, of Tiffin, Seneca county, had twelve cases, two deaths. Warren, Van Wert, Putnam, Crawford, Scioto, and Licking, each a few, all mild cases.

In Mahoning it was quite prevalent and of the simplest anginose and malignant types. Dr. McCurdy treated nearly one hundred cases with a mortality of ten per cent. Dr. Jenkins, of Belmont, reports fifty-five cases with no deaths. Cuyahoga and Crawford report it more malignant than usual. Dr. Jenner, of Crestline, sending account of twenty-two malignant cases, fourteen deaths.

Concerning cholera infantum, the report from Dr. Jenner, Shelby county, is that last year he saw none of it. Putnam was singularly exempt. Monroe reports only one case, nearly all the other counties had each a few more. Ross had it extensively and often fatal. From Mahoning and Warren the report is that it was quite prevalent though not fatal, about two per cent. Dr. Herrick reports it quite prevalent in Cleveland and very fatal, and for Lawrence Dr. Wilson remarks that more die from this disease than any other. Dr. Thornton, of Cincinnati, reports it somewhat prevalent and fatal.

To the inquiries concerning puerperal fever, the following counties report none: Fairfield, Lorain, Ross, Madison, Erie, Darke, Coshocton, Monroe, Huron, Brown, Belmont and Putnam; the following each two or three cases: Lucas, Marion, Seneca, Mahoning, Warren, Van Wert, Fulton and Crawford. Auglaize reports five cases in autumn, all fatal, and all attended by two physicians. Cuyahoga reports more or less always. Scioto was free from it for many years until last, when there were ten cases and four deaths. As to causes severe and protracted labor, retained coagula, exposure to currents, obstructed lochia, are the sum of answers received.

Dysentery during the past year does not seem to have

prevailed to a great extent any where in the State. All the counties report it sporadically with a few deaths; while in Darke, Coshocton, Auglaize, Monroe, Brown and Lawrence it was more prevalent, with a mortality of from fifteen to twenty per cent. Time of prevalence, August and September.

In reference to pneumonia, Lucas county was remarkably free from it; in Ross it was more common than usual, destroying quite a number of prominent citizens in the city of Chillicothe. In Madison and Crawford it was more prevalent than usual, with a large proportion of deaths.

To the inquiry whether any other disease was more prevalent than ordinary, Dr. Allen reports the malarious type to have been more than usually prevalent, and never before used quinine by injection with such success. Dr. Franklin, of Ross, reports premature births quite common, antedating by a month or two the time expected. Accounted for by malarial cachexia, as was also an unusual propagation of the first stage of labor. Erie had more sickness than ordinary, though of a miscellaneous character; from Darke and Seneca comes the report that pulmonary consumption is largely on the increase. Mahoning had an unusual number of children sick with catarrhal fever. Huron, Crawford, Licking and Van Wert, influenza very prevalent.

The Relations of Epilepsy to Insanity and Jurisprudence.

BY W. J. CONKLIN, M. D.,

Assistant Physician of Southern Ohio Lunatic Asylum, Dayton, O.

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Epilepsy and insanity may sustain various relations to each other.

1. The two diseases may originate at the same time and be due to a common cause. The following cases are instances of this relation:

L. L., æt. sixteen, being alone one night during the absence of the family in which she served, was terribly frightened by two men endeavoring to enter her sleeping apartment. She was thrown into convulsions and became delirious, when they ceased. Her mind rapidly failed. The fits recurred at short intervals, usually at night. She is now, ten years after the occurrence, a hopeless dement, and apparently from loss of muscular co-ordination is barely able to pronounce her own name.

F. McK., æt. 27; maternal cousin insane; for three years he had given himself up to all manner of excesses and dissipations. He experienced a regular epileptic seizure, from which time his friends noticed symptoms of mental derangement. The convulsions returned at intervals of four weeks; after the third fit he became violently maniacal and was admitted into the asylum.

2. Epilepsy may be developed in the course of chronic insanity. Beyond question, the degenerated condition of the nervous system which the insanity itself indicates is a fertile soil for the springing up of nervous disorders of all kinds; but the frequency with which epilepsy occurs as a sequence among the chronic insane, by no means an inconsiderable per cent of our population, is not great.

The tendency of many organic brain diseases is to epileptiform seizures. A large number of the cases of convulsions occurring in the old residents of an asylum are due to the presence of a tumor, exostosis, softening or other cerebral lesions, which we are, oftentimes, able to accurately diagnose during life. These cases should be excluded from epilepsy proper. From our limited experience, we are inclined to consider true epilepsy as an infrequent result of insanity. Many so called cases of the relation under consideration are really examples of masked epilepsy: others may be cases of undiscovered epileptic vertigo, which have passed into the graver form of the disease.

It may be considered a fact, that the appearance of convulsions in an attack of insanity is always of grave portent, and is usually the forerunner of death. Within the past two years, seven cases have occurred in this institution confirmatory of this proposition. These include all cases in which the convulsions appeared primarily in the course of the mental disturbance, and they all died in from twenty-four hours to nine days after the supervention of the convulsions. It may be well to remark, that none of them presented the peculiar character of epileptic insanity.

In two of the above cases the insanity had a duration of one year; in three cases it was of three years duration; in one it dated back ten years, and in another twenty years.

Post mortem examinations of the brain were made in two cases. In one of them, in whom the mental symptoms were of three years duration, the dura mater was found attached

to the skull, and, in places, along the longitudinal fissure, was firmly united to the arachnoid. The vessels of the arachnoid and pia mater were enlarged and engorged with blood. About the middle of the right anterior lobe there was a loss of brain substance, measuring one half of an inch in length and one quarter of an inch in breadth. The puncta vasculósa of the white substance were quite numerous and distinct. The corpus striatum and optic thalamus of the right side were much less firm in texture than the corresponding parts of the opposite side.

The autopsy of the second case in which the insanity was of twenty years standing, revealed nothing abnormal, save an unusual adherence of the dura mater to the calvarium and considerable congestion of the left hemisphere. The brain substance was not microscopically examined in either case.

3. Another relation, important in a medico-legal as well as psychical point of view, is that of transformation or replacement, in which the mental manifestations take the place of the regular convulsion. The morbid action in the sensory centres seems at one time to be transferred wholly or in part to the motory centres, giving rise to muscular convulsions; and at another time to the mind centres, giving rise to convulsive ideas. Epileptics often speak of the torture and anguish they feel, when they have gone longer than usual without the fit, and the feeling of relief experienced after it is over.

It is not unusual in the history of the insane to find some previous bodily lesion becoming latent or masked on the accession of the mental derangement, even though the latter may be the result of the former. This occurs frequently among the phthisical, when on the supervention of insanity the tuberculization is for a time arrested. Dr. Burrows tells of an eloquent divine, who was always maniacal when free from pains in the region of the spine, and sane when

the pains returned to that spot. We know that physical lesions will often for the time stop epileptic seizures.

K. F., age 22, subject to epilepsy from her childhood, fell into the fireplace in a fit, and was terribly burned over the chest, abdomen and thighs. Her fits, which had been previously severe, and rarely missing more than two days at a time, ceased, and did not return for twelve months, during which the wounds were healing. As soon as the burn healed, the fits returned with their former frequency and severity.

The arrest of the fits from any cause often produces an increase in the severity of the mental symptoms. This is seen in the effect of medical treatment. Often when by the exhibition of some medicine the fits are lessened in frequency, the patient is rendered more irritable and peevish, it may be violent. In a discussion at the last meeting of Asylum Superintendents,* Dr. Gundry said, "One Doctor gave medicine, and six months afterwards the cry was raised, 'You cured him of epilepsy, and the people wish he had fits again, because he is so infernal cross.' I have found in many cases, I may say, when the fits were intercepted, the same nervous excitement takes their place."

Dr. Walker, of the Boston Lunatic Asylum, said, "There are two or three cases, as stated by Dr. Earle, when the epileptic fits have been decreased, and they have been made irritable and are more violent. They were not subject to it when the fits came regularly, and it was thought proper to let them have a fit occasionally to sweeten them."

Every asylum presents cases in which so long as the convulsions occur with their usual frequency, no unusual mental symptoms present themselves, but as soon as the seizures cease, the most marked mental disturbance ensues, often violent in nature, and attended with delusions and hallucinations; with the reappearance of the convulsions the

* American Journal of Insanity, October, 1870.

patients resume their normal mental state. Still more frequently occur those cases, in which brief but violent outbursts of fury—blind impulses to destroy, overpower the mind and impel to homicidal, suicidal or destructive acts—occasionally replace special convulsive seizures. The delusion or hallucination which often becomes apparent just before an outbreak may be justly compared to the aura; "the moral instability to the irregular involuntary character of the muscular action; the sudden impulse with the fit, and the temporary unconsciousness with the coma."

Many instances of replacement will appear in the progress of this paper. In this connection we will relate but one case, taken from Dr. Schupman. An epileptic, during convalescence from a severe attack of cholera, was free from his usual epileptic seizures. He became restless, agitated, conceived that he felt some living thing moving in his stomach, and finally declared that he was pregnant. The slightest contradiction led to such violence that it become necessary to confine him to a chair. Many expedients were adopted to remove his delusion, among them an accouchment was imitated. He retained his delusion in spite of treatment, until the attacks of epilepsy returned, when it immediately disappeared.

4. Epilepsy may stand as the cause of insanity. This relation has a two-fold nature: It may be a predisposing cause, or it may be an exciting cause.

Epilepsy is now generally recognized as a strongly marked hereditary disease. Statistics show that epileptic children are more likely to be born from an insane than from an epileptic parentage. It may be stated as a general law, that the same neurosis from which the parent suffers is not necessarily transmitted to the offspring, but save in suicidal insanity alone, the type or character of the disease is more liable than otherwise to be transformed. Families of epileptic parents sometimes exhibit insanity in one of its mem-

bers, epilepsy in a second, peculiarities of character in a third, and chorea or some other neurosis in another member. Rarely do we find individuals tainted with epilepsy to be entirely healthy. They nearly all possess some vice of constitution which renders them incompetent to meet successfully the ordinary trials and troubles of life; often they exhibit the insane or epileptic neurosis, which are very similar to each other, and render the individual more susceptible to the ordinary exciting causes of insanity. Dr. A. Foville* gives an interesting account of seven observations upon epileptic families. He traced two families for three generations, and four families through four generations. I append his table, which comprises 129 persons, either ancestors or descendents of the special epileptic patient, who is designated by the initial of his name.

* Annales Medico-Psych., Vol. 11., p. 229.

SYNOPSIS OF SEVEN OBSERVATIONS OF THE FAMILIES OF EPILEPTICS.

OBSERVATION.	FIRST GENERATION.	SECOND GENERATION.	THIRD GENERATION.	FOURTH GENERATION.
I.	1 Father, epileptic	8 Sons, epileptic	3 Grandsons, epileptic	1 Great-Grandson, epileptic.
II.	1 Grandfather, insane, epileptic	1 Father, insane, epileptic	1 *G.* Male, epileptic 2 Sisters, insane. 1 Brother, intelligent but odd.	?
III.	1 Grandfather, insane	1 Father, insane, married, 1 Mother, epileptic	1 Sister, presumed sane 1 *M.* Female, epileptic	3 Children, died in infancy. 3 Presumed sane. 1 Daughter, hysteric. 1 Daughter, epileptic.
IV.	1 Father, epileptic	1 *Maz.* Female, epileptic, married	9 Children died early, 1 Son, presumed sane	?
V.	1 Grandmother, insane	1 Mother, presumed sane,	2 Sisters, died early. 4 Brothers, died early. 1 *Bac.* epileptic 1 Sister, scrofulous.	4 Children, died early.
VI.	1 Father, epileptic. 1 Uncle, imbecile	1 Sister, died young. 1 *X.* insane, epileptic 1 Brother, epileptic 1 Brother, insane 4 Others presumed sane 1 Cousin, insane 2 Cousins, presumed sane	1 Daughter, epileptic 1 Daughter, presumed sane 3 Nephews, epileptic. 27 Nephews and Neices, sane. ?	2 Little Children, so far sane. 2 Little Children, so far sane. ?
VII.	1 Grandfather, epileptic,	1 Father, epileptic 2 Aunts, sane	1 *B.* epileptic 5 Brothers and Sisters, died early 1 Daughter, scrofulous 2 Daughters, presumed sane 4 Cousins, sane	Married, but no children. Not married. 5 Nephews and Neices, sane. No children.
Total,	8	27	72	22

Casting this table in a different form we find:

Generation.	Epileptics.	Insane.	Presumed Sane.	Children Died early.	Total.
1	5	3			8
2	14	3	10		27
3	11	2	39	20	72
4	2	1	12	7	22
Total, . .	32	9	61	27	129

It is but fair to presume that some of the sixty-one *presumed sane* at the time the observations were made, would, if their subsequent history were traced, increase the number of the epileptic and insane.

M. Herpin, in 380 relatives of 68 epileptics, found ten epileptic, twenty-four insane, and forty-four others laboring under some nervous disorder. He calculates that the relatives of epileptics exhibit epilepsy about five times more frequently, and insanity about twenty four times more frequently than does the French population generally.

The forty-two cases of insanity due to epilepsy, admitted into this institution, in which the parties were only interrogated in regard to the prevalence of mental disorder in the ancestry, we find:

	M. E. T.
No Hereditary Predisposition.....	13, 8, 21
Hereditary Predisposition...	8, 6, 14
Unknown.....	4, 3, 7
Total.....	25, 17, 42

The frequency with which epilepsy occurs as an exciting cause of insanity can not be exactly determined. The testimony of nearly all observers agree as to the ultimate result upon the intellectual faculties. Esquirol* found among 339 epileptic females in the Saltpetre, 269 in a state of mental alienation, and this proportion, though large, would doubtless be increased if the final history of the remaining ones

* Maladies Mentales, t. 1., p. 142.

were traced. Trousseau* writes: as the fits recur, increase in frequency, in proportion as the disease progresses, the faculties fail, are impaired, become gradually extinct, and insanity follows.

Dr. Echeverria† holds the following language: "Epilepsy contrasts singularly with the other diseases in the deep marks it impresses on the organic and moral constitution of the individual. Scarcely do we find confirmed epileptics, who, on careful examination, would not afford evidence of this statement. The intellectual impairment originates by degrees, or by imperceptible stages—nay, it may be tardy in its display, though it affects the instincts and emotions from the beginning."

Dr. Sieveking‡ remarks: "A single fit may occur never to return, and without leaving any trace of disease. More commonly, however, unless the disease be arrested and the habit broken, the fits recur with gradually increasing frequency, and it is then that we soon discover the intellectual faculties begin to fail."

Dr. Blandford§ writes: "This is a condition quite distinct from the loss of memory and general dementia, which, if the fits are at all frequent, gradually encroaches upon the mind, and almost without exception terminates the career of every epileptic, even when there has been no insanity so called throughout the entire illness."

Dr. Reynolds,|| however, analyzed sixty-two cases in reference to their mental condition, and arrived at conclusions differing from the authorities above cited. He concludes:

1. That epilepsy does not necessarily involve any mental change.

2. That considerable intellectual impairment exists in some cases, but that it is the exception and not the rule.

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* Clinical Lectures, p. 67.
† Echeverria on Epilepsy, p. 362.
‡ On Epilepsy, p. 59.
§ Insanity and its Treatment, p. 76.
|| Epilepsy, p. 46.

3. That women suffer more severely and more frequently than men.

4. That the commonest failures is loss of memory, and this if regarded in all degrees is more frequent than integrity of that faculty.

5. That apprehension is more often found preserved than injured.

6. That ulterior mental changes are rare.

7. That depression of spirits and timidity are common in the male sex, but not in the female. That excitability of temper is found in both.

He found the class in which there was no discoverable departure from normal mental action to be thirty-eight per cent. of the whole number. This result, so different from that reached by most observers, should receive a special investigation.

Dr. Reynolds remarks, a page or two in advance, "From the following analysis I have excluded all cases of positive insanity, of general organic disease, of distinct cerebral disease, where, although there may have been convulsions, there was not prominently a case of epilepsy, and all instances of simple eccentric convulsions."

That all in the above enumeration, save *positive insanity*, should be excluded, is right and proper; but it hardly seems fair to throw out insanity resulting from epilepsy, in an inquiry which has for its object the ascertaining of the effects of epilepsy upon the mental powers. It must certainly lead to erroneous conclusions, when in analyzing a certain number of cases to ascertain the frequency of a lesion all those cases in which the lesion is best marked are excluded. Epilepsy is a chronic and progressive disease, and the only way of accurately determining its effects upon the organism is by ascertaining the mental and physical condition in the later years of life. Because no mental or emotional irregularity was discoverable at the time his observations were made,

does not prove that such irregularity did not manifest itself in the subsequent history of the case.

Dr. Reynolds also selects loss of memory and apprehension as points of departure in estimating the mental health of the individual. These, however, are certainly qualities of mind in which slight deviations are scarcely discernable, and the failure of which in any notable degree marks advanced disease. The departure from health would probably manifest itself primarily in the affective faculties, irrregularities of which nearly always precede derangement of the intellectual faculties. Unfortunately, on account of limited hospital capacity, nearly all of our asylums exclude insanity complicated with epilepsy because of its incurability, and hence the data for computing what per cent. of the insane is due to epilepsy, are very imperfect.

Dr. Dunglison's statistics of 11,269 cases, compiled from the reports of American asylums, the large majority of which exclude epileptic cases, gives epilepsy as the eleventh cause in frequency. Taking the annual reports for 1870 of Longview Asylum, State Lunatic Asylum, Pa.; Western Pennsylvania Hospital, and Missouri State Lunatic Asylum, in which institutions the chronic insane are not, so so speak, legislated against, I compile the following table. It must, however, be remembered that the chronic insane are practically excluded, owing to insufficient hospital accommodation and to the greater pressure rightfully made in favor of a recent and probably a curable case.

ASYLUMS.	Whole number of admissions with known cause.	Relative frequency with which Epilepsy occurs as a cause.	Number of males admitted with known cause.	Relative frequency of Epilepsy as a cause among males.	Number of females admitted with known cause.	Relative frequency of Epilepsy as a cause among females.
Longview Asylum	1,801	6th	939	3d	862	10th
State Lunatic Asylum, Pa.	1,560	4th	799	3d	761	6th
Western Pennsylvania Hospital	1,602	6th	928	5th	674	6th
Missouri State Asylum	1,120	2d	640	2d	480	5th
Total	6,083	.....	3,306	.....	2,777	.....

Putting this result in a different shape, we find that in 6,083 admissions attributable to known causes, epilepsy is responsible for 6.39. Of 3,306 males, 8.62. Of 2,777 females, 3.74 are caused by epilepsy.

Dr. Nichols, Superintendent of the Government Hospital for Insane, Washington, D. C., in a private letter, after remarking that it is impossible to state with accuracy the per cent. of admissions caused by epilepsy, says, "Nine per cent. of the admissions to this hospital are epileptic." Dr. Kellogg, Assistant Physician New York City Lunatic Asylum, writes me that of 436 males in the asylum, 7 per cent. are epileptic; of 864 females, 4.50 per cent. are epileptic. A census of the weak minded in Scotland, taken several years ago, showed nearly eleven per cent of the whole number to be epileptic. The conclusions warranted by the above data are only approximatively correct. The error is, however, not in favor of epilepsy.

All statistics as to the causation of insanity are to be received with allowance; the above with more than the usual allowance, since they only concern the few insane epileptics who have received admission into an asylum. The proportion which they bear to the whole number, may be judged when we consider the crowded condition of our county and city infirmaries.

From the foregoing we may consider:

1. That epilepsy is a potent cause of insanity.
2. That a larger percentage of male than of female admissions are due to epilepsy.

A question naturally arises in this connection, possessing much interest in a medico-legal sense, as to what is the true mental condition of epileptics. There is no denying the fact that persons subject to periodical attacks of epilepsy are of unsound nervous constitution. The fact that there is an utter unconsciousness at the time of, and for a variable period succeeding the fit, during which coma may ensue, or

automatic acts, from the mildest to the most destructive, may be performed; during which the person is, so to speak, morally dead, shows a vast difference between the class of people under discussion and perfectly healthy ones. True, we are all periodically unconscious during sleep, and may perform acts of which there is afterwards no remembrance, but there is this prominent difference: the latter is a physiological phenomenon, and to a slight extent is under the control of the will; the former is a pathological phenomenon wholly removed from the control of the will, and dependent upon a disease, the tendency of which is to a gradual extinction of the mental faculties.

Esquirol says, "They (epileptics) have exalted ideas, they are very susceptible, irascible, obstinate, difficult to please, odd—they all possess some peculiarity of character."

M. Calmeil writes: "That all epileptics not yet insane are irascible, very impassionable, and disposed to false interpretations."

Baillarger* says: "All authors are agreed in admitting the fact that epilepsy, before leading to complete insanity, produces very important modifications in the intellectual and moral condition of certain patients."

Dr. Burgess† writes: "Epilepsy and chorea are so closely associated with madness as to obtain a special and family character with it."

Dr. Blandford‡ while holding that epilepsy is not the equivalent of insanity, admits that there is good grounds for considering the mental condition of epileptics unsound.

Dr. Browne,§ Ex-Commissioner of Lunacy for Scotland, says: "However much the minds of epileptics may in some respects resemble those of healthy individuals, they differ from all those and differ in the same respect."

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* Medical Critic and Psych. Journal, Vol. 1.
† Relations of Madness, p. 45.
‡ Op. cit., p. 172.
§ Journal of Mental Science, Oct., 1865.

That persons prominent in the world's history, and others who have achieved eminence in particular callings, have suffered from epileptic seizures does not negative the proposition. Let us, however, briefly glance at the roll. Napoleon is usually quoted as an example of this class. His character certainly has many points in common with the epileptic character, and presents numerous evidences of a diseased nervous system, but I am unable to find authority for the assertion that he was an epileptic. The translator of Trousseau refers to Sir Thomas Watson,* but he distinctly says: "Napoleon is said, I know not upon what authority, however, to have suffered something like epilepsy during sexual intercourse."

Mahomet is also included among the number. The researches of Dr. Weil and Washington Irving confirm the suspicion that he was subject to epilepsy; although his biography is so enshrouded by Arabian fables and traditions, what is known certainly presents evidence strong enough to convince the most sceptical that he was the possessor of an unhealthy nervous organization. Ayesha, one of his wives, and Zeid a disciple, bear witness that he was at one time siezed with violent convulsions, after which he would lie with his eyes closed, foaming at the mouth, and bellowing like a young camel. Cadijah, his first wife, also noticed similar spells while in Mecca, before the pretended revelation of the Koran. Irving† finds the explanation of his conduct in his "enthusiastic and visionary spirit gradually wrought up by solitude, fasting, prayer and meditation, and irritated by bodily disease (epilepsy) into a state of temporary delirium, in which he fancies he receives a revelation from heaven, and is declared a prophet of the most high."

As to Cæsar, we are told that at one time when the Senate was offering him special honor, he acted discourteously

* Principles and Practice of Physic, p. 414.

† Life of Mahomet, pp. 61, 335: Vol. 1.

to the Senators, and observing their displeasure, bared his throat for the knife to the very men assembled to show him respect. He then excused his conduct on account of the malady from which he suffered, saying: That those attainted are unable to speak when standing in public, that they experience shocks throughout their frame, that they suffer from vertigo, and finally lose consciousness altogether.*

Peter the Great, who was subject to some nervous disorder, considered by many to have been epilepsy, has also been included in the list.

At the death of his son by Catherine, he was seized with convulsions; he threw himself prostrate upon the ground and remained there unattended for three days and nights.

Charity would certainly try to shield his many shortcomings under the garb of disease. The civilization of the period in which he lived can hardly be responsible for the neglect of all the civilities and politenesses due to equals, especially when he is their guest, any more than his, at times, almost barbarous treatment of the Czarina. It is related, that when stopping at Magdeburg, on his road to Berlin, he gave an audience to the select Magdeburg public. During the audience, the Duke of Mecklenburg with his duchess, who was a niece of the Czar, arrived. At the sight of the latter "Peter started up, satyr-like, clasping her in his arms and snatching her into an inner room, with the door left ajar, and there — it is too Samoedic for human speech, and would excel belief were the testimony not so strong."† Shortly after, dining with Friedrich Wilhelm and the Queen, at Berlin, the Czar placed himself by the side of the Queen. During the meal he experienced a seizure, became convulsed, gesticulated wildly, danced around the Queen with a knife in hand, and finally grasped her hand with such violence as to cause her to shriek out.

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* Psychologie Morbide; Moreau. P. 551.
† Frederick the Great; Carlisle. Vol. 1., pp. 348—350.

Petrarch, Italy's greatest lyric poet, was an epileptic; and see him, all his life long a victim to his passion for Laura, of whose virtues and memory he so delighted to sing, and from whom neither fame nor friends nor time could wean him. He fell in love with her on seeing her in church, and even went so far as to declare his love, though she was already the wife of another. For ten years he was constantly agitated between his love and his reason. Depressed in spirits, he left Avignon and travelled, to rid himself of his passion, but in vain. His love for her was not exclusive, for we learn that the mortification of being the father of an illegitimate son, though he afterward had an illegitimate daughter by the same woman, he retired to Vancluse, where "his ears were disturbed only by the sounds of nature, and only one female came, a swarthy old woman, dry and parched as the Libyan desert."

From Dr. Browne* I quote the following:

"Conceive the golden-mouthed apostle Bossuet, a victim to the petit mal, terrified by the prospect of lythotomy, losing language, shorn of the glorious gifts which even now give him a prominent place among the orators and defenders of the Christian faith, and think of him as haunted, persecuted, tyrannized over by an ever-recurring ode of Horace, which excluded every other thought and feeling.

"Moliere has been added to this group. Suffice it to say, that he was incapacitated for thought or work, for that was his work, for fifteen days after every fit, that he lived on milk; drew his own portrait in writing "Le Malade Imaginaire;" had a fit while acting the part, which, with consummate skill, he concealed under a laugh; that he was estranged from his wife; chose an old woman critic of his plays; and was denied Christian burial, as much on the ground of his eccentricities as his infidelity.

"Newton's glimpses of 'cycle in epicycle rolled,' ended in

*Jour. Ment. Science. October, 1865.

epilepsy and dementia. The tic nerveu and perhaps the opiomania of Madame De Stael ended in delirium. The delicately strung system of Pascal is a sort of lay figure upon which to study the most rare and mysterious neuroses. He lived under incessant attacks of petit mal, and died convulsed. He wrote the bitterest satire and the most generous and genial dissertation on ethics. He was a mathematician, moralist, philosopher, but he believed in charms and amulets, and at all times, however occupied, there was an ever-yawning gulf beside him—a gulf into which he could not divest himself of the apprehension that he might be precipitated."

Hence, we see that these men, great as they were and who are usually considered as examples of epileptics suffering no departure from mental health, when closely scrutinized give unmistakable evidence of a diseased mental organization. These cases, however, constitute the exception; all that could be proven by them would be that such men had intellectual stamina enough to withstand to any degree the injurious effects of the disease. Had their mental power been no greater than the large majority of epileptics, they would have exhibited the failure of the class. Just how far the disease may have affected their private and social relations it is impossible to judge; doubtless much of the irritability which is excused on account of their peculiar surroundings is in reality the outcropping of the disease.

Again, great as these men were, the characters of most of them present some grave moral obliquities, and who will say that some blots which now blacken their fame would have occurred had their nervous systems been healthy.

The mental condition of epileptics may manifest itself prominently in three directions:

1st. In temporary outbursts of delirium or uncontrollable fury.

2d. In a perversion of the moral qualities.

3d. In an attack of regular maniacal excitement, lasting from a few hours to several weeks.

These divisions are to a certain extent arbitrary, it is rare to find them distinct for any length of time; they usually blend together, or occur at different times in the same individual. Still for description it serves our purpose, inasmuch as the first or second condition may for quite a while be the only psychical manifestations of the disease.

We may state in the outset, that epileptic insanity in any of its manifestations is paroxysmal, like the seizures to which it always bears some relation. As the convulsion is the grand de appui, the mental symptoms naturally arrange themselves into, 1st, Those immediately preceding or succeeding the fit; 2d, Those occurring between the fits.

Our first division, characterized by paroxysms of blind fury, and which not infrequently constitute the only departure from normal mental action, possesses great legal interest. In the intervals, which may continue for months or even years, the person manages his business affairs and performs the ordinary duties of life, seemingly with as much tact and judgment as ever; still, close scrutiny reveals a certain mental condition peculiar to the class, prominent in which may be mentioned a changeableness of thought, action, and feeling. He becomes irritable, is greatly annoyed by trivial matters, grows suspicious of those around him, at times is despondent and given to gloomy thoughts, or again he is over-exhilarated and abounds in magnificent projects for the future. As the disease progresses, he becomes at one time quarrelsome, and again, is imbued with religious sentiments. He becomes forgetful, suffers from confusion of thought and loss of apprehension. He leaves off his industrious habits, becomes niggardly, or, it may be, prodigal of his worldly goods, until finally his insanity becomes unquestionable.

This storm of passion—this furor epilepticus—at times

sweeps like a whirlwind over the mind and impels to the most wanton acts. The will of the sufferer seems overwhelmed by the disease, and he is transformed into a perfect automaton, dealing injury and destruction to persons and things around him. The paroxysm may expend its force in harmless action, but usually culminates in some act of violence. The painful nature of the delusions and hallucinations of epileptics may afford a partial explanation of the violence of their actions. Hallucinations of sight, and especially of blood and red colors, occur most frequently. Often just preceding and during the explosion they see armed men, ghosts, assassins, who rush upon them to kill them.

These paroxysms may precede, follow or replace the regular epileptic convulsion. In the majority of cases the mental excitement precedes the convulsion. It is not unusual to hear an attendant say, "Doctor, I don't believe she would have her fits if she did not get so angry. She gets so mad at some one that she throws herself into a fit." In point of fact, the anger is as much beyond the patient's control as is the convulsion which it foreshadows. The fact that the psychical phenomena do replace the seizure is admitted by all; and in some cases, constituting the epilepsia larvalis of Morel, these mental symptoms may be the only manifestations of disease.

The explanation may be that the morbid activity which in uncomplicated epilepsy is restricted to the medulla oblongata, is by some means extended to the cerebrum, causing an epilepsy or convulsion of the brain; for it must be admitted, that the delirium in the suddenness of onset, the violence of its course, the shortness of its duration, and in the resemblance of successive attacks, presents strong analogies to the physical phenomena. However, with our present imperfect knowledge of the pathology of epilepsy, we are unable to wholly explain the above phenomena, or to understand why an attack of furor or mania should occur in connection with

the convulsion in one person and not in another, or in the same person at different times. Dr. Blandford* says that "we must suppose that the disturbance in the brain circulation implied by the epileptic seizures does not at once subside, as it does in a patient who in an hour appears to be in all respects sane and unchanged. The reaction, if we may so term it, after the fit or fits brings about a great disturbance of the circulation, and, according to the degree thereof, symptoms of insanity may appear, varying from a moderate mania to wild and unconscious delirium."

The second manifestation of epileptic disease is in the perversion of the moral faculties. "Epilepsy leads to depravity," says a recent author, and its truthfulness is attested by all having experience with this form of disease. When little or no intellectual aberration is apparent, the moral qualities seem to be blunted. This moral blindness, which contrasts strongly with the individual's previous character, may continue as the constant state, or, which is the more common, may be of variable duration, and of periodical recurrence. It occurs occasionally as the first manifestation of epileptic disease, and may occur at regular intervals for a long period before convulsions make their appearance. The subsequent appearance of the convulsive seizures offers an explanation, if not justification of their conduct. In this class, lying, thieving, and the whole category of minor crimes is indulged in, seemingly out of pure love of crime; little regard is paid to law, either human or divine, and they figure constantly on the police dockets. Maudsly associates moral insanity more frequently with epilepsy than with any other disease. Epileptic criminals prove wholly incorrigible and nothing is more significant than the fact that in spite of all punishment they persevere in their criminal ways. This state of affairs, however, soon changes, the intellect becomes involved and undoubted insanity results.

* Op. Cit.; p. 76.

We now proceed to examine that form in which the excitement extends over a longer period, rarely, however, persisting longer than two or three weeks at a time. Insanity into which epilepsy enters, either as a cause or complication, has, so to speak, a physiognomy of its own. It may manifest itself in any one of the three grand divisions of mental disease, mania, melancholia, and dementia, but it so impresses its peculiar type upon the symptoms, that the epileptic element can be readily diagnosed. Of the mental condition of the asylum epileptic in the interval between his paroxysms of excitement, it is unnecessary to add to what has already been said, except to state that the peculiarities then spoken of are all increased. He is forgetful, irritable, suspicious, fault-finding, liable to outbursts of anger and impulsive actions of all kinds.

The peculiarities of epileptic insanity are, first, the abruptness of the invasion. Often the attack can only be foretold a few minutes previous to its occurrence; the more common prodromes are changes in his disposition or feelings, or pain in his head. The onset may be violent, or the patient may leave off his occupation abruptly and wander here and there without any definite idea—a vague feeling of restlessness comes over him, a desire to go, whither or why he knows not. "This impulsive want to wander about," says Jules Falret, "is nearly constant in this mental state, and deserves to be carefully pointed out." In this state, he is subject to gloomy fears and forebodings, and often, a word spoken, the presence of certain persons, or it may be a mere subjective sensation, is sufficient to call forth the most murderous attacks. These explosions of violence, during which homicide or the most atrocious crimes may be committed, of which we have already spoken as constituting in some cases the only tangible departure from mental health, are equally characteristic of this form of the disease. They also occur in the demented. E. M., perfectly demented, whose insanity

dates back a quarter of a century, has convulsions only at long intervals, but is subject every few days to terrible paroxysms of fury. With a scream she will throw herself on the floor, strike her head, kick and bite, and talk incoherently about graveyards. In a few minutes the paroxysm ends as quickly as it began, and she returns to her normal condition. The attack, though violent, is brief, and generally ends suddenly, though not with the abruptness that marks the onset. The culmination is sometimes reached in an explosive act, after which the patient wakes up as from a dream. In one case, where the excitement had extended over several weeks and who was especially dangerous to his companions, the patient struck a person in no way interfering with him, a violent blow over the eye, and almost immediately the attack ended. Other cases run a different course, and present merely the volubility of words and restlessness of action of ordinary mania, and still rarer cases present the depression of melancholia. However, these cases usually present greater perversion of the moral qualities, are very suspicious, often manifest erotic tendencies, and are more irritable and impulsive in their doings, than similar cases not having the epileptic element.

There are two other peculiarities of these attacks of mania which deserve especial mention from their judicial importance. I refer to the coherency of thought manifested during the period of excitement, and the imperfect recollection afterwards of things said and acts done. The observations of Jules Falret are so pertinent that I quote the following: *"In spite of the disorder and violence of their acts, *their language is in general considerably less incoherent than that of many insane individuals.* It is surprising how easily, in spite of their state of agitation, one can follow the train of ideas expressed by epileptics. Their delirium is more connected and comprehensible than is usual in mania. They

* Quoted by Trosseau. Clinical Lectures; p. 76.

understand better the questions put to them, they answer them more directly, more exactly, and notice what goes on around them more frequently than most insane persons suffering from general delirium with excitement. The less marked incoherence of the delirium and the greater distinctness of ideas during the attacks, are all the more remarkable that they singularly contrast with the nearly total obliteration of all recollection of the fit after it is over, a defect of memory which is also an almost constant symptom of the attacks of epileptic mania."

The following cases illustrate the above: M. S. has been subject to fits for the last eight years, rarely escaping longer than a week at a time. She had several seizures during the day; suddenly she sprang up from the bed, upset everything in her room, and ran up and down the ward, praying in a loud voice for deliverance from the evil-doers around her. It became necessary to remove her to another ward, at which she became very indignant, refused to go, declaring that she was removed because her clothes were not as "costly as some fine ladies," that we had long tried to cheat her out of her rights. She put a false interpretation upon every explanation that we offered, charged the nurses with every kind of misdeed, and became very obscene in her talk. Yet her statements were so coherent and her accusations so plausibly supported, that it seemed like nothing but an exhibition of bad temper. In a few days the excitement passed off; she was surprised to find herself in another ward, and had no remembrance of her removal, or of her sayings at the time, and felt grieved when told of them.

A. B., æt. 26, has been subject to epileptic vertigo and night attacks of epilepsy since her twentieth year. Several times her shoulder has been dislocated during the fit by the violence of the muscular contractions. She had shown no symptoms of mental derangement, aside from a failure of memory and occasional despondency, which was the more

noticeable from her naturally cheerful disposition. One Sunday morning, a few months ago, she went to the barn, seized an axe that stood near, and placing her head against a wagon wheel, struck several blows on her forehead and head, making some ugly wounds. She fell senseless, was soon discovered by her friends and carried into the house. She remained in this condition until her wounds were dressed by the surgeon, when she awoke and became so violently maniacal that it was necessary to confine her hands to prevent her from tearing off the dressings and injuring others. The excitement passed off in a few hours, and she had no recollection of her suicidal attempt or her after acts, and seemed much astonished when told of them. She was admitted into the asylum before her wounds were healed, and has since shown no evidences of insanity farther than the failure in memory and the irritability peculiar to the class.

There are three points of special interest in the case: 1st, She had no fit for several days either preceding or succeeding the suicidal attempt, which in all probability took the place of the regular convulsion. 2d, The interest which attaches to it in a medico-legal view. Had the impulse been homicidal instead of suicidal, how difficult it would have been to convince the court with the present ruling that she was an irresponsible agent. 3d, The fact that she has never experienced but the one paroxysm.

Morel first described a form of epileptic insanity to which he gave the name of *epilepsie larvee.* We have already alluded to it incidentally, but its importance in a legal point of view entitles it to a more careful consideration. In this form, the common convulsive phenomena are absent, but the mental phenomena are so characteristic that the class to which the disease belongs cannot remain in doubt. Morel* gives as the peculiar symptoms: "Periodical excitement followed by prostration and stupor; excessive irascibility with-

* Jour. Ment. Science. January, 1863.

out cause; the manifestation of aggressive violence, marked by instantaneity and irresistible impulse; exaltation of the sensibility; homicidal and suicidal tendencies; intercurrent insane ideas connected with the state of cerebral excitement; exaggerated notions of physical power, of wealth, of beauty, or of intelligence; erotic tendencies coupled with exalted religious feeling; hallucinations of terror; sensation of luminous atmosphere; horrible dreams or nightmare; gradual progressive debility of the powers of understanding, especially of the memory; loss of recollection of events transpiring during the paroxysms, the insane symptoms of each periodic attack having, both with reference to the ideas which occupy the mind and to the actions committed, the same identical character; and lastly the violence and duration of the delirious excitement determined by the duration of the remission." Some observers, among whom is Dr. Sankey, refuse to recognize the disease under consideration as a distinct species of epileptic insanity, but rather consider the cases adduced in its support, as examples of periodic or recurrent mania. The natural history of the two forms, however, presents many points of contrast. The epileptic form is marked especially by the abruptness of its invasion, the uncontrollable impulses to violence, oftentimes homicide and suicide, the brevity of the attacks, the absolute resemblance in deed and act of successive attacks, and the suddenness of the intermission. In ordinary recurrent mania there is a better marked period of incubation, during which the maniacal symptoms gradually appear, the attack gradually increases in severity, rarely stopping short of weeks, it may continue for months without abatement. Its force expended the patient is left for a variable period afterward in a depressed condition, from which he gradually passes into his normal condition. Though recurrent disease is not infrequently associated with acts of violence, they do not possess the furious and vicious nature of epileptic impulses. Very

often the diagnosis is confirmed if the earlier history of the patient can be traced and we find him to have formerly suffered from epileptic seizures, or again, if convulsions should appear in the subsequent course of the disease.

I present the following cases:

H. K., æt. 18, was admitted in an attack of mania. The accompanying medical certificate said he was not subject to epilepsy. For several months he had at times shown symptoms of mental derangement; he had been inclined to wander about, quarreled with persons around him, became irritable and easily excited. For ten days previous to his admission he had been very violent. Ordinarily he presented the restlessness of action and thought peculiar to mania, but at times he was seized with a perfect fury, would destroy his clothing, break up the furniture of the ward, and spring furiously upon any one who chanced to be near him, using any weapon at hand. He gave no premonitions of his attacks. He was very revengeful, and after the beginning of the attacks would seek out those whom he disliked and attempt to injure them. On removing him to his room, which was not often done without difficulty, the excitement soon passed off. He remained in this condititon about six weeks, when, after severely cutting the face of an unoffending patient, he seemed to wake up and speedily recovered. He had a very imperfect recollection of coming to the Asylum, or of his doings while here. In two weeks afterward, he had a well defined epileptic convulsion, and was subject to them at irregular intervals during the remainder of his stay in the Asylum. In tracing back his history it was ascertained that he had at least two epileptic seizures about a year before. During the eight months in which he exhibited irregularities of conduct and had an attack of mania, the seizures did not recur, but made their appearance immediately after the mental improvement.

M. G., æt. 23, when admitted had never experienced a

regular convulsion, but had for some time past been subject to occasional attacks of "dizziness or blindness." Her disease is paroxysmal; during the intermissions she is usually pleasant and assists in the work of the ward. At times she will jump up, run down the ward, break a window, and then quietly resume her seat. Again she will suddenly leave off whatever she may be doing, become abusive to the attendants whom she has just been assisting, strike persons, saying they are making faces at her, declares she is going off, and makes every attempt to get out. Several times she has succeeded, in spite of efforts to prevent her, and on one occasion she ran quite a distance over the fields with barely enough clothing to cover her nakedness. She kicks, bites and fights terrifically when returned. Usually she becomes stupid and drowsy, and rapidly comes out of her paroxysms with a very indistinct recollection of her doings. In her better periods she says she does not know what makes her act so, that she cannot help it, and does not want to go home until she is well. Her paroxysms recur frequently, and all bear a remarkable resemblance to each other. During the first remission she attended a dance in the chapel. She seemed to be highly pleased, when without a single premonition she gave a scream, and struck the patient sitting next to her. On being removed from the chapel, she escaped from the nurses, and getting into a dining-room where the table was set, assaulted them with dishes, and was soon master of the situation. The last two paroxysms passed off with tolerably well marked convulsions, and the drowsiness of previous attacks.

Dr. Thorne Thorne, in St. Bartholomew Hospital Report, 1870,* relates the following case, which I abbreviate: "H. S., æt. 36., was admitted for an attack of bronchitis. He seemed to be strange in manner shortly after admission, and on several occasions said his wife was looking in at the ward

* Quoted in Jour. Ment. Science; January, 1871.

window. One night he suddenly jumped out of bed, and rushed wildly to the door, which he had no sooner opened than he fell prostrate on his back. He seemed to retain consciousness, but offered no explanation of his conduct.

Occasional attacks of mental excitement similar to the above, occurred during his stay in the hospital. It was ascertained that for several years he had complained of severe pain in the head, and of dimness of sight and trembling. Four or five years before admission, he had several well-marked epileptic seizures, which have constantly recurred, and now average about every three weeks in frequency. Prior to his entering the hospital he had never shown any morbid mental symptoms. Several times since leaving the hospital he has suffered from mental depression which passed into maniacal excitement. His countenance becomes wild, intellect confused, and he will snatch a knife and threaten to kill his children. He rushes after them as they in terror seek to hide themselves. Several times when his wife had locked herself in the room with him, it has required all her strength and tact to prevent him from throwing himself out of the window. This excitement may last from several hours to an entire night, when he gradually becomes quiet, and usually sleeps. On awaking, he has but a dim recollection that he has been ailing, and none whatever as to what has been said or done. The patient often returned home without being able to give an account of his doings, and in these states has been guilty of petty thefts. At one time, while in this stupid state, parcels of scented powders were found on his person, which he could have had no object in purchasing, and of which he emphatically declared he knew nothing. Dr. Thorne very properly remarks, "it is impossible to overestimate the importance of such a case from a medico-legal point of view, because, though persons suffering from masked epilepsy may be as this man was, and still is, able to follow their daily avocations, yet they must

necessarily be considered as placed, at least during the continuance of their attacks, beyond the category of healthy and responsible minds. Volition is in abeyance, and hence responsibility must be also."

The *prognosis* of epileptic insanity as to permanent recovery is exceedingly unfavorable. So far as recovery from the particular maniacal excitement is concerned, the prognosis is good, but with the presence of the same cause, and that cause a progressive one, the liability to relapse is very great.

Several cures are recorded by good observers, but these must be received with some degree of allowance, since the mental and physical phenomena of epilepsy may become latent for a considerable length of time, inducing false hopes in its victims, and then break out with accumulated severity. It is very doubtful whether the mind ever thoroughly regains its tone after it has once become affected through the seizures, yet the periods of remission from active symptoms do occasionally extend over months, and even, in some recorded cases, for years.

The prognosis as to life is unfavorable, the larger number dying before the middle period of life is reached.

Last year I reported to this Society on "*The Temperature of Certain Nervous Diseases,*" and gave a table of thermometrical observations on insane female epileptics. Further experience in the use of the thermometer has confirmed the general conclusions then arrived at, and which may be briefly summed up:

I. The temperature of epileptic insanity is high, the evening altitude being in excess of that of the morning.

II. The temperature of the same individual varies largely and bears a relation to her mental condition at the time the observation is made. The periods of excitement present an increase, often amounting to several degrees over the usual temperature.

III. A depression of temperature occurs just before a

single fit, which is better marked in the sleep that follows the seizure; several hours usually elapse before the inter-paroxysmal range is reached.

IV. A succession of fits increases the temperature, and several days may elapse before the thermal equilibrium is restored.

We do not propose a thorough discussion of the jurisprudence of insanity, even when complicated with epilepsy, this is already in the hands of a special committee; but merely propose to point out the medico-legal aspects of one factor, epilepsy.

The courts have for a long time ruled the irresponsibility of acts committed in close connection with the convulsion, and tacit jurisprudence has limited the time to four days—two days preceding, and two succeeding the fit. This ruling we hope to show is wholly at variance with our present knowledge of the mental condition of epileptics, and with the ordinary psychical phenomena of the disease. We have already shown that the sanity of epileptics at any time after the development of the disease is an open question. Beyond doubt the character of the person so afflicted undergoes modification. This change can sometimes be noticed after the first seizure, becoming better marked as they recur, and is evidenced in both their mental and moral natures, the latter not infrequently betraying the greater alteration.

Dr. Ray * writes, "the fact of its (epilepsy) existence being established, is it going too far to say that legal responsibility is presumptively annulled, and that the burden of proof lies on the party that alleges the contrary? People are scarcely prepared for it yet, perhaps, but to that complexion they will come at last."

All epilepsy, according to Marc, warrants upon the event of a criminal act the suspicion of mental disorder, which suspicion is increased in the absence of personal motive.

* American Journal of Insanity. October, 1867.

Dr. Bucknill, in the preface to his Prize Essay,* says: "The existence of habitual epilepsy might justify the decision that a violent and unprovoked assault was not the result of criminal passion, but of uncontrollable excitement of the brain. * * * The psychical phenomena of epileptics are of a kind to set the metaphysicians at defiance; simple, uncontrollable anger, with or without some slight cause, and accompanied by the most reckless violence, or gloomy and cruel revenge for some supposed injury, or simple, motiveless rage, all without delusion or the presence of any of the metaphysical tests, and quickly passing into an ordinary and apparently a healthy state of the mental functions are the psychical characteristics of this fearful and obscure disease."

Dr. Burgess † holds that "a person may act and conduct himself rightly for a long period; in epilepsy he may do so for months, and even years, and although quick to evade his particular hallucination, and point out and oppose the errors of others, he may be suddenly attacked with mania himself, and neither the epileptic nor those afflicted with intermittent madness can at any time be held responsible."

Baillarger concludes a lecture before the Academy of Medicine (Paris,) with the following propositions: ‡ First, That besides declared insanity, there exists with certain epileptics a special moral and intellectual condition. Second, The medical jurist ought in many cases to apply himself to make apparent the principal traits which characterize this condition, to extenuate, at least as much as possible, the responsibility of the sufferer."

Wharton and Stille § hold, "Persons truly epileptic are easily excited to anger and revenge on the slightest provocation, in the intervals between their attacks. Although their

* On Criminal Lunacy, p. 37.
† Op. cit., p. 104.
‡ Med. Critic and Psych. Journal.
§ Medical Jurisprudence. P. 117.

attacks do not always attain to such a degree as to deserve the name of mental derangement, yet it should never be forgotten that there is always a morbid predisposition to insane ebullitions, and in general a morbid irritability which must impair, if not destroy, the moral responsibility of actions growing out of them."

In opposition to the above views, we have Caspar* asking, "How completely objectionable to declare epilepsy to be a disease which renders those affected with it irresponsible agents, as is done by the earlier authors and their modern compilers—the fact taught by experience that epilepsy occurs in nature in innumerable degrees of intensity, is opposed to the general applicability of any such dogma."

We do not believe that all the acts of epileptics should be excused because of the presence of epilepsy, as will appear further on. Dr. Caspar founds his belief upon the assertion that the mania of an epileptic patient does not differ psychologically from ordinary mania, whereas we have endeavored, successfully or not, to show that epileptic disease does manifest itself in peculiar psychological phenomena, and differs in this very respect from mental irregularity dependent upon ordinary causes.

Dr. Echeverria † writes: "Believing that there is a morbid obliteration of moral feeling in epileptics and that they are mastered by uncontrollable impulses, I would hesitate to fix the limits of their responsibility. Chronicity, to my mind, is as essential as any of the other characteristics of epilepsy, wherefore I would be far from thinking a person epileptic because he or she were troubled at some previous time with epileptiform convulsions that have not reappeared. Consequently, I reject exculpating any overt act attributed to epilepsy unless committed in clear relation with the spasm or while the perpetrator exhibited plain signs of cerebral

* Forensic Medicine. P. 188, vol. IV.

† Op. cit., p. 362.

epilepsy; and whichever be the medico-legal faith given to this last form of the disease, it is nevertheless positive that epileptics undergo a moral degeneracy through their malady and that we are never safe with them, as has recently been asserted with great truth by Delasiavue." He gives further on in the chapter two cases. I abbreviate the following: "One morning an epileptic made an assault on one of his companions with a knife, for which no provocation had been offered. He was subject to nocturnal attacks, but no mention is made of a fit having occurred the previous night. The mental trouble in this instance is not apparent to any person who would not inquire closely into the patient's symptoms."

Our courts have occasionally recognized the sufficiency of epilepsy as a defence in capital crimes. In the trial of Fyler for the murder of his wife, in Onondaga county, New York, 1855, the defense of epilepsy was entered for the first time in this country. Fyler had for several years been subject to epileptic convulsions, but without producing any obvious mental impairment beyond the immediate effect of the fit. No evidence was offered to show that a fit had occurred about the time of the homicide, or that he exhibited any of the ordinary signs of a fit. The trial, after various delays, came on a year after the commission of the crime. He was found guilty, but a committee appointed by the court to investigate his mental condition, adjudged him then insane, and he was remanded to an asylum.

Dr. Gray, Superintendent of the New York State Asylum, relates the following case:* An epileptic was on trial for the murder of his wife. The plea of insanity was entered, but the counsel having given their entire attention to the fact of insanity and little or none to the question of epilepsy, the evidence did not warrant the experts in considering the case one of insanity or irresponsibility. The pris-

* Amer. Jour. Insanity. October, 1870.

oner had a well-marked epileptic seizure in court. Dr. Gray, who sat beside him, wrote a note to the judge, stating that the prisoner was in an epileptic state, and unconscious of what was going on. The jury returned a verdict of guilty, but the court did not pronounce sentence. Under a subsequent investigation, the prisoner was committed to an asylum, on the ground that he had been an epileptic, was still an epileptic, and was, therefore, possibly a person of doubtful responsibility.

Again, the convulsions may occur at night, and the prisoner or his friends be unaware of the fact that he is an epileptic. Baillarger gives the case of Councillor Lemke as an instance of epileptic furor. It was this case that gave rise to the division of mental disease known as Mania Transitoria. The Councillor was seized with a sudden fury to kill in the middle of the night. He attempted to throw his wife out of the window, when assistance coming, she was released. His stertorous breathing a few moments before had awakened his wife, and her efforts to relieve him called forth the furious attack.

Trousseau was consulted by a newly-married couple under the following circumstances: The wife, soon after their marriage, was awakened by the strange movements of her husband. Suddenly she was attacked, and had her screams not brought help, she would have been severely injured. On a subsequent occasion, she was awakened in time to strike a light, witness the convulsion, and escape from the fury which immediately followed. Epileptic attacks were, up to this time, unsuspected.

Dr. Delasiavue * relates the case of a man who was once a patient in the Bicetre, and was subsequently returned after killing his wife. His occasional aberration of mind was plead in his defense and prevailed. It was only in the asylum on his second admission, where, save a few transient

* Noted in Amer. Jour. Ins. October, 1855.

agitations, he exhibited perfect lucidity, even to his death, occurring a long time afterwards, that his momentary wanderings, and, in part, his criminal acts, were traced to night attacks of epilepsy.

Irresponsibility should not be made dependent upon the convulsion, since *vertigo* or *petit mal* may be followed by as impulsive actions and as disastrous results as the general convulsion. Marc, with many other authors, places prominently among the conditions of immunity, the intensity of the paroxysm. Cases, however, are not infrequent in which there is no convulsion, and even the loss of consciousness is unknown to the person himself, and only observable by others, in the sudden stoppage in the midst of a sentence or an act. Yet in this unconscious interval lewd words may be spoken, laughter indulged in, incongruous or criminal deeds performed, and no recollection of them remain. Certainly the unconscious criminal should not be held responsible, though he seems sane a moment before and after.

As examples, I mention an epileptic architect who does not hesitate to ascend the loftiest scaffolding. When he has a fit, he runs rapidly over the scaffolding, shrieks out his own name in a loud voice; in a quarter of a minute he resumes his occupation and gives his orders to the workmen. Unless he is told, he does not recall his singular act.

The President of a provincial tribunal, while holding court, abruptly left his seat, muttering a few unintelligible words, and shortly returned. He had no recollection of having left his seat. Going out in a similar way on another occasion, the usher followed him. He went to the council room, made water in the corner, and returned, perfectly ignorant of his incongruous act.*

An out patient of the London Hospital has in connection with his epilepsy subjective sensations of smell. He has had convulsions in which he has bitten his tongue, but re-

* Trousseau. Op. cit.

cently there have been losses of consciousness without movement of the limbs. In these, he is unconscious, becomes pale, and usually remains still. In one attack, he went from Poplar to Deptford—eight miles. The facts are, he lost himself at Poplar, and found himself again at Deptford where, fourteen years ago, he used to live. Sometime since he walked into a canal during a seizure.*

I was recently consulted in the case of a lady, Mrs. B., æt. 50, who for a year past has been subject to what her friends call "fits of absence." She often stops in the middle of a sentence or an act, stares fixedly, and not infrequently makes remarks having no connection to the previous conversation, or hides away articles near at hand; in a few seconds she is able to finish the sentence or proceed with her work wholly unconscious of the interruption. These seizures occur at irregular intervals, but are gradually becoming more frequent, and have lately been attended with more or less twitching of the facial muscles. To give an instance: At the close of services on the previous Sunday, she experienced a seizure just as the parson's wife, Mrs. A., spoke to her. Mrs. B. shook hands, and remarked, "By high heaven, it shall not be done, I warn you." She passed half the length of the church aisle before she recovered. Then, after saluting some friends, she turned again to Mrs. A., shook hands cordially, expressed pleasure at meeting her, and engaged in conversation, without knowledge of her actions but a few minutes before. Aside from a greater irritability and suspiciousness, her friends, as yet, can detect no mental irregularity, except such as is connected with her seizures. I could adduce several cases confirmatory of the above proposition, coming under my notice in the Asylum, but prefer to offer the above examples, because the sanity of the parties was not questioned.

Dr. Pritchard and others hold that freedom from epileptic

* London Lancet, March 18, 1871.

symptoms for a considerable period renders the individual amenable to the law. We have endeavored to show that one of the chief characteristics of epileptic disease is its periodical and sudden recurrence; the remissions may be well marked and may continue for a long period, and yet all of the phenomena may reappear with accumulated severity on the slightest cause. Dr. Burgess* says upon this point: "Insanity being in the system, as in *epilepsy*, either fully developed or in a state of incubation, the paroxysmal madness is liable to commence or to return at any moment, and it is difficult to say when a lucid interval exists, when it is gone, and when it will return."

Dr. Burrows † relates the case of a quiet, sober and industrious tradesman, subject to fits of epilepsy. He was sitting calmly reading his Bible, when a female neighbor came for some milk. He looked wildly at her, seized a knife, and attacked her, and then his wife and daughter. Their cries brought assistance, and he was secured before he had inflicted any fatal wound. After the paroxysm ended he had no recollection of his acts. A year before, he had experienced a slight attack; nine years have since elapsed, without a recurrence of epilepsy, or disturbance of his mental faculties.

The strongest reason for the non-association of the crime and fit in casting up the prisoner's responsibility, is the frequency with which the furor or madness replaces the fit, constituting the different grades of masked epilepsy. We have already referred to this in different connections, and it is unnecessary to multiply examples; suffice it to say, that no fact in psychological medicine is better established than that the mental phenomena do, at times, replace the convulsions. The attack is characterized in most cases by unconsciousness, in others, by an entire forgetfulness of the act afterwards, yet these are not essential, as in the case of the

* Op. cit., p. 105.
† On Insanity, p. 156.

epileptic who in one paroxysm murdered several persons successively as he met them on the road, and had afterwards a perfect remembrance of each murder.

Now since the existence of these cases is undoubted, why should the law not recognize them? Because they seem sane just before and after the commission of the act, and are then abundantly able to judge between right and wrong, proves absolutely nothing. The ungovernable impulses are the outgrowth of a morbid condition of the nerve element very like the fit, and the convulsive impulses of the brain are as much removed from the control of the individual as are the convulsive movements of the limbs. It would certainly be as reasonable to hang a man for not keeping his limbs quiet, as to hang him for not keeping his brain quiet. The epileptic furor is not reasoning, it does not, as a rule, recognize right or wrong during the paroxysm: there is little room for doubt but that the criterion of responsibility set up by the courts is founded in error and results in great injustice to this unfortunate class.

Dr. H. Tuke, at a meeting of English lawyers in 1865, called to consider the justice of capital punishment, said that fifty-four asylum physicians had combined to combat the doctrine that the legal responsibility of the insane depends upon their knowledge of right and wrong. They agreed that "the belief in the responsibility of the insane based on their appreciation of the right and wrong, is irreconcilable with facts known to all alienists, because it is clear that this appreciation often exists in individuals whose insanity is undoubted, and it is even observed together with insane ideas and those of a dangerous and impulsive character." The German and French Alienists have almost universally expressed a similar opinion.

It is not alone the ability to decide between the right and wrong, but the power to do the right and abjure the wrong, that should determine one's responsibility. Inasmuch as the

cases are few in which the courts have ruled the irresponsibility of epileptics in the absence of the fit, those cases, of which many are recorded, in which suicidal and homicidal impulses have been felt, but through physical restraint or by the exercise of great will power have been overcome, are deserving of careful study. They are entitled to greater credence, because the same urgency for deception does not exist as when the individual is arraigned as a criminal before the judiciary.

Esquirol quotes the following: A peasant, æt. 27, had been subject to epilepsy since his eighth year. For two years the disease changed, became masked, and instead of the convulsions from which he had previously suffered, he was periodically seized with an almost irresistible desire to murder. He could foretell a paroxysm for hours, and sometimes for days before its invasion. From the moment of this presentment, he earnestly demanded to be tied or chained, in order to be prevented from the commission of crime, the moral nature of which he perfectly appreciated. He would suddenly shriek out, "Save yourself, mother, or I shall choke you." When bound, he made frightful grimaces, sang, &c. The paroxysm usually subsided in a day or two, when he would ask to be released and be thankful that he had injured no one.

Dr. Echeverria* relates the following case: A woman subject to grand and petit mal, has slight attacks of vertigo during the day, preceded by a vision of a sudden dash of fire. Her memory has failed, and she complains of feeling insane without a will. She has at times blind impulses to strike her child, and being unable to resist them, her mother has been obliged to take the child away from her.

That form of disease known as Mania Transitoria, and which has been the cause of so much bitter discussion among alienists and jurists, is probably in a large number of cases

* Op. cit., p. 370.

a manifestation of epileptic disease. If the history of those cases usually quoted as examples of transitory mania, be traced, quite a number will be found to present evidence of epilepsy. The modern view that muscular contraction is not essential to epilepsy, but that a momentary loss of consciousness may be the only sign of an attack, enables us to better appreciate these cases. We have already shown that the mental phenomena are not in proportion to the violence of the muscular seizures, but on the contrary may often bear the very opposite relation to each other. We do not affirm that all cases of transitory fury are epileptic. It must of course be borne in mind that all forms of nervous disease are more or less paroxysmal, and that hereditary insanity in particular is especially liable to explosive actions similar to those that characterize epileptic insanity.

The increased susceptibility by which internal and external impressions become altered and transformed in the passage to the sensorium deserves notice. In the peculiar temperament which epilepsy begets, an act, word, excess in living, or any irregularity which would scarcely disturb the equilibrium of a healthy organism, taken in connection with the terrible hallucinations and illusions which the epileptic experiences, and which the diseased sensory ganglia may connect with surrounding persons and things, are sufficient to instigate him to the most cruel and violent acts. If nothing more, the knowledge of this fact should extenuate the punishment meted out to his crimes.

These facts almost lead us to adopt the sweeping conclusion of Trousseau: That when a man commits a murder on a sudden impulse and without motive, if that man has not previously shown symptoms of madness, and if he were not in a state of intoxication, his action should almost always be explained by the existence of epilepsy.

Dr. Maudsley* says: "Whenever a murder has been

* Body and Mind, p. 72.

committed suddenly, without premeditation, without malice, without motive, openly and in a way quite different from the way in which murders are commonly done, we ought to look carefully for evidence of previous epilepsy, and should there have been no epileptic fits, for evidence of an aura epileptica and other symptoms allied to epilepsy."

Epileptics, in addition to their pathological infirmities, are subject to all the other infirmities of our common humanity, and hence may be guilty of misdemeanors and crimes independently of their disease. Whether any special misdeed or exhibition of anger is the result of criminal passion, or the outgrowth of disease, bearing constantly in mind the liability of these paroxysms to attend epilepsy, must be decided upon the data for deciding upon insane acts in general: i. e., the relation the parties sustained to each other; the character of the crime; the manner and place and time of its execution; the conduct just before and after its commission, &c.

When we remember that epilepsy, if not leading to undoubted insanity, brings about, in its very inception, a change in the social, moral and intellectual life of the individual; that the will power is sapped and the individual is to a greater or less degree governed by morbid impulses: when we recall the sudden and transient nature of the maniacal attacks, and the liability of homicidal acts to attend them; especially when we consider that the criminal act may replace the convulsion, and that apparent sanity may exist just before and after its commission, we are impressed with the necessity of great care in passing upon the legal responsibilities of this class of society.

Jurisprudence has, however, a two-fold object: the protection of society as well as the protection of the criminal.

The existence of epilepsy established, it is probably going too far to excuse the party from all responsibility, but it certainly should be held to have this effect until the contrary is proven, until it be shown that the criminal act was not the

offspring of the disease. Society rightfully asks that it be protected from a recurrence of the crime. Humanity, with an equal right, asks that if the crime is the result of disease the prisoner shall be spared the disgrace of punishment. An asylum is, beyond question, the proper place for the large majority of epileptic criminals. We would also recommend this disposition in those doubtful cases which so perplex expert and judge, since in these cases, a careful watch, oftentimes for a considerable period, is the only way to mete out justice. If it should appear that the disease is not father of the crime, the ends of justice would not suffer by the delay. It is not the swiftness of punishment, which often savors of revenge, but the certainty with which the offender receives his just rewards, that deters criminals and upholds the majesty of the law.

In conclusion, permit me to urge upon this Society, so noted for its appreciation of all public charities, the claims which this unfortunate class have upon us, and to ask you to second the recommendation of the Board of State Charities for the establishment of a special hospital for epileptics. The necessity of such an institution is seen in the present deplorable condition of the epileptics in the jails and infirmaries of the several counties. The number of this class at present in asylums, jails and infirmaries is about five hundred. Of this number, three hundred and fifty are in the jails and infirmaries, of whom, according to the last annual report of the Board of State Charities, fourteen are in close confinement, two are chained, and eight are quite filthy. I have no means of estimating the number of epileptics in their homes throughout the State, but from the frequent application made here for the admission of insane epileptics, I infer the number is not inconsiderable.

Another object gained by such an institution would be the relief afforded to our overcrowded insane hospitals. Even when the asylums now in process of enlargement and con-

struction are ready for occupancy, they will be insufficient to accommodate the insane, exclusive of the epileptic insane.

Every one will readily recognize the impropriety of receiving epileptics into the insane asylums: First, Because the restlessness of thought and action in mania proves a continual source of irritation to morose epileptics. Second, Because of the deleterious effect upon an already disturbed mind, or one just struggling back to health of witnessing the frightful appearance and apparent suffering of one convulsed.

In an institution designed expressly for this class, some modifications could be made in the present plan of hospital construction, so as to better meet their special wants. The suddenness of an epileptic seizure and the fall which attends it, render some provision necessary against accidental injury to themselves. Still more, epileptics, except in very rare cases, should sleep alone. The associated dormitories so common and so commendable in our insane asylums, are unfitted for epileptics.

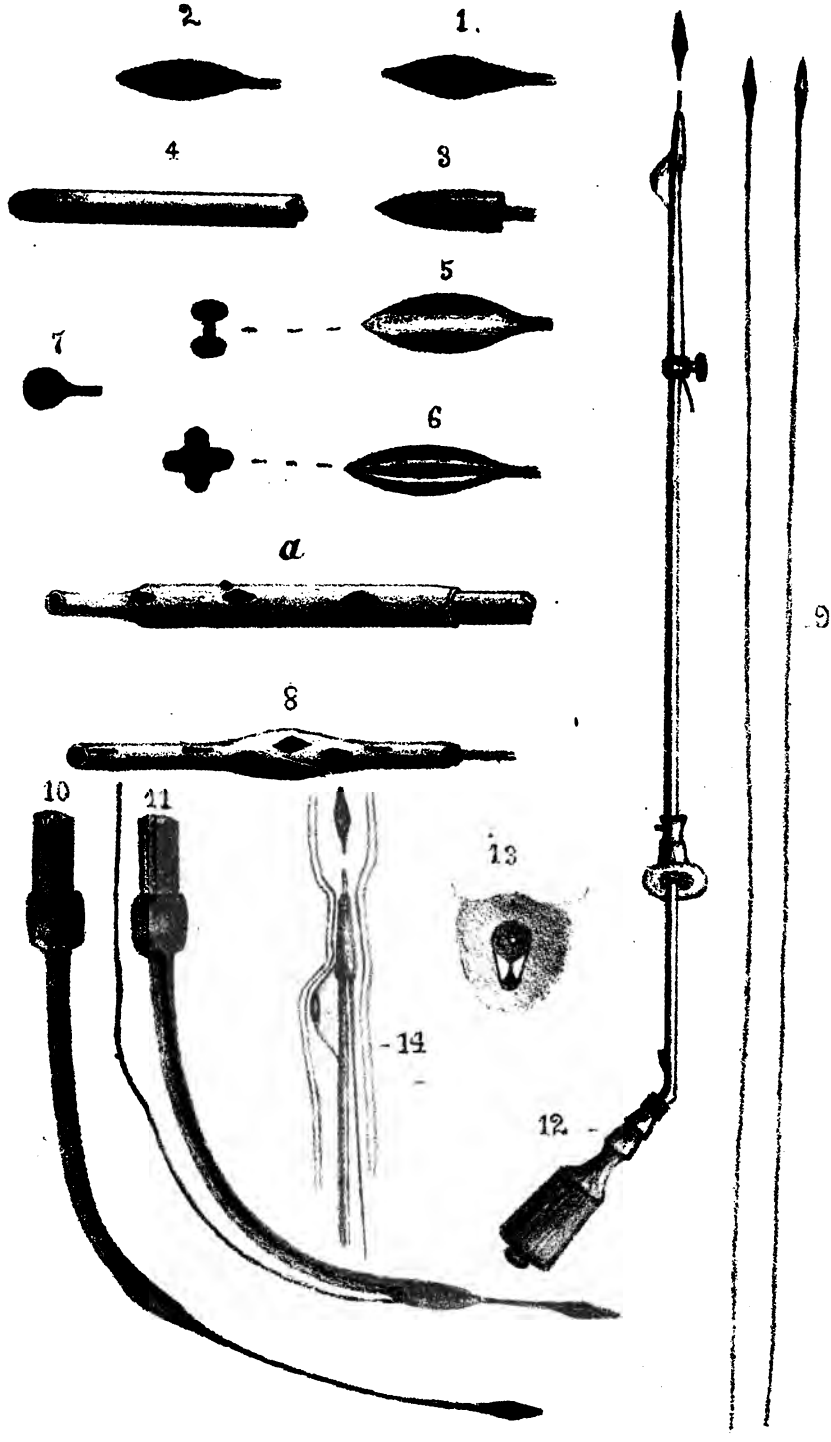
No fitter commentary can be made than to cite you to the sad case that occurred in the Lawrence County Infirmary.* Two epileptics, both subject to night attacks, were crowded into the same room and bed. "One morning the younger of the two was found strangled to death." The old man is now serving his life sentence in the penitentiary.

* Rep. Board of Charities, 1869.

Mechanical Treatment of Stricture of the Urethra.

BY D. S. YOUNG, M. D.

Prof. of Surgery in the Cincinnati College of Medicine and Surgery.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As the title of this paper implies only a reference to the mechanical department of the treatment of stricture in the urethra, we shall ignore, as far as possible, all other subjects in connection with it, either as to the symptoms, pathology or general treatment, and only refer to them as they may incidentally arise, as specially bearing upon any of the principles and instruments involved or described. Nor have we much that is new or original in the limits of the subject we have chosen, but more especially intend to investigate the causes which render instruments safe and efficient. At the same time hope to place a few of the principles involved in a more philosophical and practicable light, from information derived from experiment and observation, by which several well-known and well-established articles of our armamentorum can be modified and improved so as to further our success in the examination and treatment of stricture.

The situation, length, diameter, firmness, and number of strictures in the urethra, and the pathological changes which these circumstances may originate, are about as uniform in this lesion as in any other requiring instrumental interference; consequently, instruments have been devised to meet the several indications, acting upon principles which are vital

and must always be employed in any that can be invented. Various instruments have been adopted for the accomplishment of rupture, expansion, and the application of caustics, all requiring that the stricture be passed by a staff. We shall desist from describing or commenting upon only such of these as belong to the method and instruments we propose to investigate and describe.

The following headings will include all we shall attempt to describe and illustrate: In texture — solid, metallic, and whalebone. As to pliability — flexible, inflexible, elastic, non-elastic, and a combination of the last two.

These forms always verging according to the situation of the stricture, and to have a bulbous point—its size as small as possible. The obstruction to be passed in every instance by a sound or exploring staff, and all incisions to be made from before backward. When the operation is performed outside of the canal-perinial section, the staff is to be passed through the stricture upon a minute sound, or by having a small flexible metal explorer attached, so as to precede the main instrument. The rapid method of dilatation, the dilator being conducted upon an exploring staff or bougie.

The reasons for advocating the solid instrument are, that no material from which the soft and yielding ones are made will resist the heat and moisture of the urethra, when constructed with sufficient minuteness to admit of its being forced through a narrow stricture with eccentric openings and a tortuous course, and it is my belief, that in those cases where the filiform bougie of Maisonneuve is passed, after great patience and labor, a small metallic instrument would, in most instances, have succeeded in a much shorter time and with greater facility. I am sure that the delicate metallic instrument has succeeded quite readily where the weak flexible one has failed after frequent and protracted attempts had been made by experienced hands. The filiform explorer has many more glaring defects. First, from its extreme pli-

ability, it is almost impossible to detect, in many instances, in stricture seated far back in the canal, whether the instrument is traversing the urethra, or is being folded up in the passage, only to be discovered after it has become impacted to such an extent as to be felt from the exterior of the canal, or when it is withdrawn. We may anticipate that this impaction is going on when the instrument is within the obstruction and passing with difficulty. Its point, perhaps, has already penetrated beyond the stricture, but from the inability to define its true situation, the surgeon withdraws it, suspecting that the resistance in the constricted part is the impacting process, thereby losing what had cost him already much labor, from this inability to define his true position, which, if he could have properly understood, would have led to success. The great advantage claimed for these minute, weak instruments is their not being liable to injure the urethra. While we admit this, we also assert and believe that they are as little capable of accomplishing anything, in a great majority of difficult cases. And we also believe that firm and efficient instruments are sufficiently safe, but that their capabilities necessarily render them susceptible of injury when in the hands of careless and inexperienced manipulators.

The advantages of the solid or metallic instruments are their small size, and power to resist the effects of heat and moisture. When once entered into the urethra, they can be retained there, throughout a whole sitting. Their superior firmness imparts to the touch, both of the operating hand, and the finger externally applied, their true position. They are not subject to be doubled up before a stricture, or when partly within the strictured track. The bending, or diversion from the direction which they were intended to take, is immediately perceptible to the operator, and can be rectified without withdrawing the instrument. When composed of flexible, non-elastic metal, like annealed copper, they can

be easily changed in form by the finger pressing against the outer side of the urethra, and be made to assume any direction the manipulator may desire to give them. Thus they may be made to follow the natural canal, or be aimed against any side or point of its wall at our discretion. In fact, I believe an instrument possessing this quality is the only one which can be rationally and properly employed in that form of stricture where the openings are upon the side of the urethra, often some distance in front of the most constricted part, and which can be only penetrated by carefully examining the sides of the passage. After solid sounds have been introduced, they act as admirable guides to other instruments, either for internal incision, dilatation, or for the relief of the bladder.

The next point, safety, is of great importance, and the one which has had most to do in preventing their general use, for the profession, almost universally, I believe, are inclined to avoid a small, metallic sound, from a fear of injuring the sides of the urethra, or of forming false passages. I advocate that a small sound of flexible metal, with a proper point, is not a dangerous instrument in the hands of any person fitted to conduct an operation upon any case of stricture. These unfavorable impressions have, no doubt, arisen from the accidents that have occurred by injudicious persons attempting to pass strictures of very small calibre with a number one, two or three sound, blindly forcing the instrument against the stricture until it has been bruised or lacerated, and often penetrating the lining of the urethra, forming a new passage alongside of the natural way. If the instrument had been smaller, and of soft flexible metal, these injudicious operators could not have produced such unfortunate effects, but in the hands of a cautious, persevering surgeon, would have been readily passed without injury to the patient. The position may be stated briefly: A staff, as small or smaller than the stricture, its flexibility will give it

advantages by adapting it to the course of the passage, and prevent abuse in the hands of the injudicious. The operator's requirements are, a delicate touch with a persistent, but judicious perseverance.

Small sounds of an elastic material, as tempered steel or whalebone, are often of great service in exploring and passing strictures with tortuous courses, or where more than one exists. From their elastic qualities, the shaft may be made to curve slightly; this throws the force produced upon the extremities of the instrument. It is of a persistent, ever ready to be relieved pressure, and whenever the point of the instrument is introduced within the orifice of an irregular, deviating stricture, this elasticity of the shaft will carry the point through the irregular passage, seeking, as it were, its way of itself, in a manner independent of any direct force from the hand, or guidance from the mind of the operator. In the same way, sometimes, the entrance of the passage can be discovered, and one obstruction after another passed. But it is an expedient, and, like all others practiced upon the urethra, it is subject to abuse, and should not be too harshly applied, or long continued in any one case at a sitting, while in irritable and inflamed strictures, it should be but slightly employed or altogether avoided.

In cases where there were several strictures, with fistulous openings, I have succeeded in effecting a passage with whalebone instruments, with comparative ease, where I had been completely foiled with all others. I may add, that this material is superior, in my opinion, to any substance that has, as yet, been introduced. It is not materially affected by the heat and moisture of the parts; its flexibility is active, but at the same time gentle. The greatest objection is that they are not as safe or capable of acting as directors for the passage of other instruments over them for enlarging the opening to its proper dimensions; yet after they have been once introduced, they act as important indicators of the extent

and direction of the perverted channel, and enable the surgeon to substitute the more appropriate guide, which, without their aid, could not have been introduced.

Inflexible instruments possess greater penetrating powers than the flexible and elastic, but are inferior in their range of application, being only fitted for exploration in the urethra anterior to the bulb. Their rigidity prevents their being sharpened, so as to comply to the course of the diverted passage, consequently the urethra will be compelled to yield to its form, which will cause great pressure to be employed in passing it, and prevents its ready entrance into constriction beyond. Or, when they have been entered, do not enable the surgeon to be certain of the fact, as in the use of flexible sounds, where there is a compromise between the course of the canal and the shape of the instrument, which, in a manner, is made to conform to it. Besides, inflexible instruments are more liable to injure the structures than the flexible, either in the hands of the skilled or the inexperienced. But a combination of these two qualities, the flexible and inflexible, is, in many cases, of great importance in the exploration of strictures in old men, caused by disease of the prostate, or that portion of the passage between it and the bulbous or spongy part. This part of the urethra when diseased is as susceptible to injury as any other, its passage may be as irregular and varying, requiring all the advantages of a flexible instrument to comply with its tortuous and constricted course. But if this flexible property extends throughout the whole length of the instrument, it will be in a number of cases useless, from the inability of the operator to convey its point in any but a forward and backward direction. The curve of the canal and the flexibility of the staff prevent him from directing it against any given point, except by external force, against the perineum or through the rectum. But with a staff of inflexible metal extending down to or beyond the curve beneath the pubis, with flexible

metal extending beyond, composing about one-fourth of the whole length, this will, in a great measure, be obviated, and we have an instrument that is controllable at the will of the operator, and is both safe and effective.

In all explorations for stricture, or for the evacuation of the bladder, strict attention should be given to the curve of the instrument, for nothing is more irrational and impracticable than to attempt to adopt one that will act with equal success upon stricture or obstructions in all sections of the urethra, yet we often see attempts made to accomplish this impracticable feat. Sir Henry Thompson, who has given much attention to this subject, has, after much thought and investigation, adopted a course which he has found to comply with that of the sub-pubic tract in a great proportion of cases. It is the arc of a circle, three and a quarter inches in diameter, the chord of the arc measuring two inches and three-quarters. While this, no doubt, is a proper form for catheters and sounds, to be used when no serious obstruction exists, it most certainly is not the best for explorations in all parts of the urethra, for small and intricate strictures, it being too much curved for that part anterior to the sub-pubic deflection. While it might be proper in some cases beyond that point, in a vast majority of cases, where the obstruction is situated in the prostatic region, especially in old men, it will be found too straight, and the abrupt curve of Bell and Civiale will be more effective.

The form of the point of exploring instruments intended to traverse the urethra in a natural condition, or when contracted and diverted by stricture, is a subject of greatest importance. We have a variety of shapes, all having advocates, proclaiming for each superiority over all others. Among the most prominent, are the cylindrical, conical, bulbous, spherical and knotted. In practice, I have observed the facility with which the bulbous-pointed metallic bougies are propelled through both permanent strictures and the

passage temporarily closed by spasmodic action, and also have heard others remark the same experience, but have never heard any satisfactory reason for this easy introduction. Some explain it by asserting that the urethra contracts behind the bulb and urges it forward, while the anterior portion of the bulb distends and opens the passage before it, so as to enable it to move forward without any obstruction. Others have no explanation, but accept it as a fact, the result of experience. To them, it is a mechanical operation, that performed its duty more easily than others, as many medicines produce beneficial effects, without, at the same time, giving any cause for their results. The cause for the small amount of force required in propelling a bulbous point through the urethra, is readily explained by the simplest laws that govern the effects of friction in all cases; that is, the smaller the surface that is exposed to a given pressure the smaller will be the amount of power required to propel it.

This led me to make several experiments with instruments of different shaped points through an elastic tube, to ascertain the comparative amount of force required by each to propel it through a given space. I constructed a square frame, with two cross-pieces at the top, about two inches apart. Upon the under surface of the lower piece was attached a piece of rubber tubing; immediately above its orifice was a hole through each cross-piece which held steadily the shaft to which the parts were attached, perpendicular to the tube, through which they were to be passed. Upon the upper end of the shaft was arranged a cup, into which a sufficient quantity of shot were placed to force it through the tube. Eight forms of instruments were selected, and all submitted to the same test as near as possible. The circumstance which caused the greatest discrepancy in the experiment was, perhaps, the relaxation of the tube, and the greater ease with which it would permit an instrument to pass after several had preceded it, or the less amount of resist-

ance each instrument encountered than that which preceded it; but this discrepancy was so slight as not to materially affect the experiment as to a correct general result. The forms of the instruments will be readily understood by referring to the accompanying figures.

The first chosen was figure 1, which from theoretic grounds was supposed would meet with less resistance than any of the others. On loading the cup with shot, it was found that fourteen ounces were required to propel it through the tube. The next was figure 2, which most resembled figure 1, but being more conical in form, required one pound three ounces. Figure 3 did not pass until one pound eleven ounces was applied. And a cylindrical sound, figure 4, the same diameter as the others, required two pounds nine ounces to carry it two inches, and when further force was applied by the hand, the tubing was broken from its fastening when it had proceeded four inches and a quarter. A flat instrument, the same length and circumference as those preceding, figure 5, which represents a side and sectional view, required two pounds eight ounces. Before the experiment, I supposed it would move under less weight than any of those experimented with. Another of the same dimensions, formed like figure 6, was propelled by two pounds and about four ounces. A perfect sphere, figure 7, moved under thirteen ounces. I afterwards passed them through an orifice made with a small chisel through a calf's ear, which I fancied might resemble somewhat the character of a stricture, and found that to the hand, the same comparative amount of force was required as in the experiments with the tube. The sphere was not passed satisfactorily, from the great difficulty in introducing it into the small incision. By making a series of small incisions at regular distances and situations, and passing the several instruments, these incisions will become extended. The extent of this expansion, and the number acted upon by each form, exhibits very plainly the com-

parative extent of the tube that is put upon the stretch by each, the one displacing the greatest extent of the tube, will produce the greatest amount of friction, consequently will require the greatest amount of force to propel it. Thus figure 1 distended least, and was carried through by the smallest weight of shot, while figure 4, the cylindrical in form, extended the whole of the tube as far as it advanced, and required the greatest amount of force, which had to be increased as it penetrated. This result is illustrated by figures *a* and 8.

Before the experiment, I supposed that points like figures 5 and 6 would pass with the least resistance, from the small amount of surface exposed to friction, which proved incorrect, these experiments demonstrating that an instrument in passing through a tube in which the pressure is thrown upon a few points or sides is greater than in one where it is equally distributed around its whole circumference, as in figures 1 and 2. Upon examining the inner surface of the tube, I found that where figure 5 was passed a deep indentation was made, condensing and polishing its track. I also observed that in passing figures 1 and 7, that while they passed with about the same amount of resistance, when both were in a perpendicular line with the tube, there was a considerable difference when they were diverted laterally, or diagonally to it, in which position the conical point, figure 1, moved with the greater facility.

Eleven years ago, I commenced the use of whalebone sounds for the exploration of stricture. They were constructed small, and with bulbous points, after figure 2, which I was led to adopt to prevent injury to the parts, and for the purpose of determining the extent and number of the strictures. But the property which first attracted my attention to this material was its elasticity, as I had seemingly succeeded in passing obstructions by this quality with the small gum catheter upon its elastic steel stylet. Another valuable

property was the facility with which it could be made to assume any form after being exposed to the flame of a lamp so as to give it the proper shape, to enable the surgeon to command all parts of the passage. With this instrument I always succeeded in passing a variety of strictures at the City Infirmary, while on duty at that institution.

While in the army, my attention was attracted to the small metallic sound as an explorer and pilot to instruments through stricture in the use of Holt's dilator, when the idea occurred that it was the correct principle, and should be used for the introduction of all instruments for the treatment of stricture, and for the evacuation of the bladder in cases of spasmodic constriction. The disease last mentioned was of quite frequent occurrence in the service, caused by cold and exposure in the field. In many cases, where relief was not attained by rest or opium, the patient suffering great pain, I readily passed a gum catheter—number 8—over a wire with a bulb made of sealing-wax. After the wire was introduced, the catheter was passed over it, a hole having been made in its lower extremity for the introduction of the guiding wire, which passed up alongside of the stylet; the catheter and stylet were then steadily pressed along over the wire till it reached the constricted part, when it was forced through the resisting space with little difficulty or danger to the parts, the stylet and wire withdrawn, and the urine evacuated. Since then I have dilated the constriction with the dilator over an explorer, and then passed the catheter.

These observations and experiences led to the preceding investigations and experiments. The two together have suggested a few instruments constructed upon the principles they have presented to me. For an exploring sound for all parts of the urethra: A minute wire staff, represented by figure 9, of soft, flexible metal, silver, annealed copper, iron, or brass, polished, or coated with untarnishable metal; the

size not being larger than No. 4, French scale, bulbous point, formed of two cones united at their bases, the apex of one for the point of the instrument, the other attached to the shaft; its greatest diameter about as thick again as the shaft. For explorations of the posterior parts of the urethra, beyond the sub-pubic arch, in difficult cases: A staff of the same size as that just described, the anterior three-fourths of which is composed of firm, tempered metal, the remainder of soft, flexible material, the same as the other instrument. This forms a safe, controllable instrument, where the one of flexible material throughout its whole length would be inefficient.

Great difficulty is often experienced in passing the sound in perinial section, although that portion which enters and occupies the stricture in Symes' instrument, is usually smaller than the other part of the staff anterior to it, its size and form often renders its introduction extremely difficult. To obviate this, I have adopted two expedients. The first, figure 10, is a staff of steel, the usual form down to a point, where Symes' instrument is diminished and grooved, at which point I add an extremity, about as long again as in his staff, composed of soft annealed copper. At the point of juncture between the two metals is a bulb, increasing the diameter about two lines; this acts as a guide to the upper part of the stricture, which is often difficult to detect with Symes' staff, in cases where there is a great thickening of the parts. The superior half of the copper extremity is the usual dimensions of the instrument of Syme, except the lower half inch is larger, by not being made flat, as the remainder above it is, on the convex side. The remaining half, below this round half inch, diminishes in size abruptly until it is of the size of No. 4, French scale, except the point, which is terminated by the bulbous point like figure 1. This is a staff, mounted by a permanent explorer, which can be changed in form to act in any direction, and be passed

through strictures with ease. The half inch that remains round expands the constriction so that the diminished flattened portion passes more readily, and at the same time give an idea of the extent of the stricture.

The other instrument, figure 11, is of the same material as this first, and of the same forms, except that it has not the terminal explorer. But through the end of the copper extremity, which is of the same size and shape as the upper half of the copper appendage of the first instrument, is a small orifice proceeding up a short distance and escaping upon the convex side, as in the exploring staff of Van Beuren. Through this orifice the small exploring wire is passed, it having already been passed through the stricture, and the staff is made to follow it through the constriction.

For increasing stricture, our instrument is, in a manner, a modification of Maisonneuve's; yet it differs from it in many important particulars. His requires that a staff of considerable size should first be passed, which in difficult cases is not a favorable instrument for exploration, although armed with the filiform appendage. In the use of our instrument, the stricture is first passed by the minute exploring sound, which acts as a guide to the incising blades. Figure 12 illustrates its various parts. It is composed of a handle and shaft of steel, the latter being one-fourth of an inch in diameter. Upon the lower surface of the shaft is a groove, running its whole length; into this groove runs the shaft of the incisor, which is attached posteriorly to a movable piece with a projecting rim, by which the shaft and incisor is projected forward and backward in the groove; it is held into the groove at the lower end of the shaft by a ring, which is retained in its place by a thumb-screw. After the exploring wire or staff is passed through the stricture, it is conducted through the guide of the incisor, and then placed into a small groove upon the upper side of the shaft, beneath the ring, and immediately under the screw,

which also retains it firmly in its position. The incisor is upon the same principle as Maisonneuve's. The guide, through which the exploring shaft passes, is placed above and in front, and is largest, immediately opposite the cutting end of the incisor. The incisor has a cutting edge only in front, and has a blunt under side, which acts as a dilator to the incised stricture. The guide is made larger opposite the cutting edge, in the first place, to hold the urethra away from the sharp surface laterally; and again, to place the stricture, when it has entered it, upon its utmost tension, so as to be incised more readily. Figure 13 is a sectional view of the instrument within the urethra, illustrating how the sides are held from the cutting edge as it advances through the unobstructed passage. Figure 14 represents the guide within the stricture and the cutting edge commencing the incision. If a very small exploring sound is employed, it is best to detach it from under the screw, when the incisor is withdrawn from the urethra, as it may double up and injure the passage, but if it be of the size of No. 4 and ordinarily firm, it can be withdrawn without this precaution.

For expansion or rupture without incision, a shaft with a conical bulb can be substituted for the incisor, and be made to pass over an exploring wire or bougie, as with the other instrument. It acts and is constructed upon the same principle as the dilator recently introduced in this country from Paris.

With our present experience, the cases which most properly belong to the incision, are those that are very sensitive and occupy a considerable length of the urethra, and are narrow and firmly constricted, and probably those cases where more than one stricture exists. Those in which dilatation is the most suitable operation, are where there is a tolerance of instruments, a stricture of but small extent, and of an expansible character, and those situated in the posterior portion of the passage.

Appendix to a "Historical Review"

FOUND IN THE VOLUME OF TRANSACTIONS FOR 1870.

BY EDWARD B. STEVENS, M. D., CINCINNATI.

In a paper read by me last year, I was unable to find any record of the meetings of the State Convention for 1846 or 1847. I learn that this body met in 1846 in the city of Columbus, May 12, continuing in session three days. It will be borne in mind that the organization of the State Society dates from this meeting, the formal organization taking place on Thursday evening, May 14. Dr. A. H. Baker, then of Preble county, was President, and Drs. J. F. Hibberd, (now of Richmond, Ind.,) and S. M. Smith, of Columbus, were Secretaries. Papers were read by Drs. L. M. Lawrence, John Butterfield, R. L. Howard, Robert Thompson, R. Hills, and perhaps others.

Columbus, May 18, 1847.

Dr. John B. Thomson, of Franklin county, President.

Dr. S. M. Smith, } Secretaries.
Dr. J. H. Tate, }

The contributions were well maintained and of value. It is somewhat interesting to note that the religious exercises were conducted by members of the Convention. The opening prayer on one occasion being by Dr. Landon, of Franklin county, and on another occasion by Dr. Drake.

In regard to another matter alluded to in the paper last year, I have received the following note of explanation from Dr. James F. Hibberd, who was the first Secretary of the Society:

PROF. STEVENS—*Dear Sir:*—In speaking of "Medical Organizations in Ohio," to the Ohio State Medical Society at its twenty fifth annual meeting, you say:

"These voluntary Conventions continued to be held until 1851, but the State Society was organized in 1846, and for three years, 1846-1851, conventions were held simultaneously with the Society, and at the same place. It is not exactly easy to understand why the two organizations were thus continued, especially as the active men of both were the same."

My connexion with the Medical Convention of Ohio began in 1844 at Mount Vernon. Many of us felt that these independent annual conventions were not all that the profession in Ohio needed; there should be a permanently organized body with a continuous record, and succession of authority from year to year. In 1846 this feeling became so strong that it was determined to form a State Society, and the first idea was to turn the whole Convention into such society by the adoption of an organic law. But the Convention was a voluntary association, to which almost any one might come and be admitted with scarcely a question asked. Many objectionable persons had thus become connected with it, so it was arranged among a few of us that we should form a State Society, which should be more exclusive, and into which members should be admitted in a more formal way than obtained in the Convention. With these sentiments, a number of us assembled and organized the Ohio State Medical Society, not intending, for the time at least, to supersede the Convention, which was to continue as a more open and democratic institution, which it did for several years, and during my sojourn in Ohio—till 1848—it was the more important body of the two at our annual May assembling.

Our purpose of excluding objectionable persons was only partially successful, as many of them managed to gain access to the Society, and probably never suspected that there had been any thought of trying to exclude them from professional fellowship.

One may speak of these affairs at this date without offense, inasmuch as, so far as my information extends, the parties unfavorably alluded to have all gone to their final account, and are beyond the chance of impress by any words of mine; and it seems to me proper to give you these facts now that the mystery of running two organizations at the same time and place, and apparently by the same men, may be solved, and to make more complete the history of medical conventions in Ohio.

This about completes the chain of History of Medical Organizations in Ohio.

CONSTITUTION

OF THE

OHIO STATE MEDICAL SOCIETY.

ARTICLE I.

SEC. 1. This Association shall be called the "OHIO STATE MEDICAL SOCIETY," and shall be composed of resident and honorary members.

ARTICLE II.

SEC. 1. The Society shall constantly have in view:

First—The association of the profession, for the purposes of mutual recognition and fellowship;

Second—The maintenance of union, harmony and good government among its members, thereby promoting the character, interests, honor and usefulness of the profession;

Third—The cultivation and advancement of medical science and literature, and the elevation of the standard of professional education.

ARTICLE III.

SEC. 1. The resident members shall be regular practitioners of medicine and surgery in the State of Ohio, who shall be elected by vote of a majority at any regular meeting, their eligibility having been previously reported upon by the Committee on Admissions.

ARTICLE IV.

SEC. 1. Honorary members shall only be admitted by a vote of two-thirds of the members present, at a regular meeting, having first been recommended by the Committee on

Admissions. The whole number of honorary members shall not exceed one hundred.

ARTICLE V.

SEC. 1. A vote of two-thirds of the members present shall be requisite for the expulsion of a member, which vote shall be had in consequence of a report from the Committee on Ethics, at the next regular meeting subsequent to such report.

ARTICLE VI.

SEC. 1. The officers of this Society shall be a President, four Vice-Presidents, two Secretaries, a Treasurer and Librarian, all of whom shall be elected annually, by ballot, and a majority vote, at the regular meeting. They shall severally perform the duties assigned in the By-Laws, as shall also the Standing Committees.

ARTICLE VII.

SEC. 1. The following Standing Committees shall be annually appointed by the President, and shall each consist of five members: 1st, an Executive Committee; 2d, a Committee on Finance; 3d, on Publication; 4th, on Medical Ethics; 5th, on Medical Societies. A Standing Committee on Admissions, of like number, shall be elected by ballot, and a majority vote, at the same meeting, annually.

ARTICLE VIII.

SEC. 1. No part of this Constitution shall be repealed, annulled, altered or amended, except at a regular meeting, subsequent to one at which a proposition to that effect may have been made in writing, and then only by a vote of four-fifths of all the members present.

AMENDMENT TO ARTICLE III., CONSTITUTION.

Resolved, That the officers of the several County or District Societies, auxiliary to the State Medical Society, be requested each year to report to the Secretary of said Society the names of all their members, to serve as a basis for the medical statistics of the State; and that the several Colleges of the State furnish the Secretary with a list of their graduates, annually; and that no physician, not in good standing in his own County or District Society, shall hereafter be admitted as a member of the State Medical Society.

BY-LAWS.

ARTICLE I.—MEETINGS.

SEC. 1. At all meetings the presence of fifteen resident members shall be necessary to constitute a quorum.

ARTICLE II.—OFFICERS.

SEC. 1. The President shall be elected annually, at the regular meeting in June, by nomination, ballot and majority vote. He shall preside, enforce a due observance of the Constitution and By-Laws, see that all members of committees and officers perform their respective duties, appoint all committees not otherwise provided for, give the casting vote only, sign diplomas and all other official documents requiring his signature, and perform such other duties as appertain to his office by usage and custom.

SEC. 2. The Vice-Presidents shall assist the President in the performance of his duties; in his absence, shall preside in order of seniority, rank being determined by the number of votes cast for each at his election. If the number of votes shall be equal, age shall confer precedence.

SEC. 3. The Secretaries shall keep the minutes of the proceedings of all meetings, notify officers, etc., of their appointments, and the duties required of them, sign diplomas, and certify to all official acts requiring the same, receive the signatures and initiation fee of newly elected members, and do such other business as shall be required, or as the Society may, from time to time, direct in their department.

SEC. 4. The Treasurer shall receive all moneys due to the Society, and pay all bills endorsed by the Finance Committee, and countersigned by the President, keeping correct accounts of the same, and making a full and detailed report at the annual meeting in June.

SEC. 5. The Librarian shall have charge of all books, manuscripts, instruments, preparations, and other scientific property belonging to the Society; shall keep a catalogue of the same, in the usual manner, and report upon the condition of his department to the annual meeting in June.

ARTICLE III.—STANDING COMMITTEES.

SEC. 1. Standing Committees shall keep regular minutes of their proceedings, and furnish an authenticated copy to be deposited with the Librarian.

SEC. 2. It shall be the duty of the Committee on Admissions, upon receiving the names of candidates for membership, to make due inquiry, and report such as may be found worthy, to the Society, which may thereupon elect them. Should the Committee fail to report upon nominations submitted to them, any member having made such nomination may renew the same directly to the Society, in which case a vote of four-fifths of the members present shall be requisite to constitute an election.

SEC. 3. The Committee on Ethics shall hear all complaints of breach of etiquette, or violation of Medical Ethics; it shall decide all questions of Ethics submitted to it. If any member shall be charged, in writing, with any violation of the provisions of the Constitution or By-Laws, or with unprofessional conduct, a copy of such charge shall be furnished to him, himself and his accusor cited to appear, when the Committee shall proceed to hear the case, reserving its decision to be reported to the Society, when its action may be affirmed by a vote of a majority of the members present.

SEC. 4. The Committee on Finance shall superintend the monetary affairs of the Society, inspect and audit all bills and the accounts of the treasury, and make such an assessment, by a *pro rata* tax upon the resident members, as may be necessary for incidental expenses, which, however, shall be subject to the approval of the Society.

SEC. 5. The Committee on Publication shall superintend the printing of such papers as may be ordered to be published, so that they may be issued upon uniform paper, etc., under the title of "transactions."

SEC. 6. The Executive Committee shall digest and prepare the business of each meeting, provide suitable rooms for the purposes of the Society, recommend plans for the promotion of its objects, and in all things protect and superintend the general interests of the Society.

SEC. 7. The Committee on Medical Societies shall consider the report on the organization of such Medical Associations as desire to become auxiliary to the State Medical Society, and generally take charge of this department; making, at each annual meeting, as complete report as may be practicable.

ARTICLE IV.

SEC. 1. Any resident member vacating his membership, shall thereby be divested of any right or title to any portion of the funds, or other property of the Society.

SEC. 2. Every member, on admission, shall pay the sum of $3.00 as an initiation fee, and sign the Constitution and By-Laws; nor shall he be entitled to the rights of membership until the same is paid.

SEC. 3. All vacancies of office shall be filled *ad interim* by the President.

SEC. 4. These By-Laws may be suspended by a three-fourths vote at any regular meeting, and they may be repealed or amended by a similar vote, notice of the same having been given in writing at a previous meeting.

SEC. 5. Rules of order, and all questions arising upon the same, shall be determined by parliamentary usage.

AMENDMENT TO BY-LAWS.

Resolved, That the Secretary be instructed to notify each member where his name occurs on any of the Committees, who have work to perform for the next meeting, within two weeks after adjournment.

CODE OF ETHICS

OF THE

AMERICAN MEDICAL ASSOCIATION.

ADOPTED BY THE OHIO STATE MEDICAL SOCIETY.

OF THE DUTIES OF PHYSICIANS TO THEIR PATIENTS, AND OF THE OBLIGATIONS OF PATIENTS TO THEIR PHYSICIANS.

ARTICLE I.—*Duties of Physicians to their Patients.*

SEC. 1. A physician should not only be ever ready to obey the calls of the sick, but his mind ought also to be imbued with the greatness of his mission, and the responsibility he habitually incurs in its discharge. These obligations are the more deep and enduring, because there is no tribunal other than his own conscience to adjudge penalties for carelessness or neglect. Physicians should, therefore, minister to the sick with due impression of the importance of their office; reflecting that the ease, the health, and the lives of those committed to their charge, depend on their skill, attention, and fidelity. They should study, also, in their deportment, so to unite *tenderness* with *firmness*, and *condescension* with *authority*, as to inspire the minds of their patients with gratitude, respect and confidence.

SEC. 2. Every case committed to the charge of a physician should be treated with attention, steadiness and humanity. Reasonable indulgence should be granted to the mental imbecility and caprices of the sick. Secrecy and delicacy, when required by peculiar circumstances, should be strictly

observed; and the familiar and confidential intercourse to which physicians are admitted in their professional visits, should be used with discretion, and with the most scrupulous regard to fidelity and honor. The obligation of secrecy extends beyond the period of professional services; none of the privacies of personal and domestic life, no infirmity of disposition or flaw of character, observed during professional attendance, should ever be divulged by the physician, except when he is imperatively required to do so. The force and necessity of this obligation are indeed so great, that the professional men have, under certain circumstances, been protected in their observance of secrecy by courts of justice.

SEC. 3. Frequent visits to the sick are in general requisite, since they enable the physician to arrive at a more perfect knowledge of the disease, to meet promptly every change which may occur, and also tend to preserve the confidence of the patient. But unnecessary visits are to be avoided, as they give useless anxiety to the patient, tend to diminish the authority of the physician, and render him liable to be suspected of interested motives.

SEC. 4. A physician should not be forward to make gloomy prognostications, because they savor of empiricism, by magnifying the importance of his services in the treatment or cure of disease. But he should not fail, on proper occasions, to give to the friends of the patient timely notice of danger when it really occurs; and even to the patient himself, if absolutely necessary. This office, however, is so peculiarly alarming when executed by him, that it ought to be declined whenever it can be assigned to any other person of sufficient judgment and delicacy. For the physician should be the minister of hope and comfort to the sick; that by such cordials to the drooping spirit, he may smooth the bed of death, revive expiring life, and counteract the depressing influence of those maladies which often disturb the tranquility of the most resigned in their last moments. The

life of a sick person can be shortened not only by the acts, but also by the words or the manner of a physician. It is, therefore, a sacred duty to guard himself carefully in this respect, and to avoid all things which have a tendency to discourage the patient and to depress his spirits.

SEC. 5. A physician ought not to abandon a patient because the case is deemed incurable; for his attendance may continue to be highly useful to the patient, and comforting to the relatives around him, even in the last period of a fatal malady, by alleviating pains and other symptoms, and by soothing mental anguish. To decline attendance under such circumstances, would be sacrificing to fanciful delicacy and mistaken liberality that moral duty which is independent of and far superior to all pecuniary consideration.

SEC. 6. Consultations should be promoted in difficult or protracted cases, as they give rise to confidence, energy, and more enlarged views in practice.

SEC. 7. The opportunity which a physician not infrequently enjoys of promoting and strengthening the good resolutions of his patients, suffering under the consequences of vicious conduct, ought never to be neglected. His counsels, or even remonstrances, will give satisfaction, not offense if they are proffered with politeness, and evince a genuine love of virtue, accompanied by a sincere interest in the welfare of the person to whom they are addressed.

ARTICLE II.—*Obligations of Patients to their Physicians.*

SEC. 1. The members of the Medical Profession, upon whom are enjoined the performance of so many important and arduous duties toward the community, and who are required to make so many sacrifices of comfort, ease and health, for the welfare of those who avail themselves of their services, certainly have a right to expect and require that their patients should entertain a just sense of the duties which they owe to their medical attendants.

SEC. 2. The first duty of a patient is, to select as his medical adviser one who has received a regular professional education. In no trade or occupation do mankind rely on the skill of an untaught artist; and in medicine, confessedly the most difficult and intricate of the sciences, the world ought not to suppose that knowledge is intuitive.

SEC. 3. Patients should prefer a physician whose habits of life are regular, and who is not devoted to company, pleasure, or to any pursuit incompatible with his professional obligations. A patient should also confide the care of himself and family, as much as possible, to one physician; for a medical man who has become acquainted with the peculiarities of constitution, habits, and predispositions of those he attends, is more likely to be successful in his treatment than one who does not possess that knowledge.

A patient who has thus selected his physician, should always apply for advice to what may appear to him trivial cases, for the most fatal results often supervene on the slightest accidents. It is of still more importance that he should apply for assistance in the forming stage of violent diseases; it is to a neglect of this precept that medicine owes much of the uncertainty and imperfection with which it has been reproached.

SEC. 4. Patients should faithfully and unreservedly communicate to their physician the supposed cause of their disease. This is the more important, as many diseases of a mental origin simulate those depending on external causes, and yet are only to be cured by ministering to the mind diseased. A patient should never be afraid of thus making his physician his friend and adviser; he should always bear in mind that a medical man is under the strongest obligations of secrecy. Even the female sex should never allow feelings of shame or delicacy to prevent their disclosing the seat, symptoms and causes of complaints peculiar to them. However commendable a modest reserve may be in the

common occurrence of life, its strict observance in medicine is often attended with the most serious consequences, and a patient may sink under a most painful and loathsome disease, which might have been readily prevented had timely intimation been given to the physician.

SEC. 5. A patient should never weary his physician with a tedious detail of events or matters not appertaining to disease. Even as relates to his actual symptoms, he will convey much more real information by giving clear answers to interrogatories, than by the most minute account of his own framing. Neither should he obtrude upon his physician the details of his business, nor the history of his family concerns.

SEC. 6. The obedience of a patient to the prescriptions of his physician should be prompt and implicit. He should never permit his own crude opinions as to their fitness to influence his attention to them. A failure in one particular may render an otherwise judicious treatment dangerous, and even fatal. This remark is equally applicable to diet, drink and exercise. As patients become convalescent, they are very apt to suppose that the rules prescribed for them may be disregarded, and the consequence, but too often, is a relapse. Patients should never allow themselves to be persuaded to take any medicine whatever, that may be recommended to them by the self-constituted doctors and doctresses, who are so frequently met with, and who pretend to possess infallible remedies for the cure of every disease. However simple some of their prescriptions may appear to be, it often happens that they are productive of much mischief, and in all cases they are injurious, by contravening the plan of treatment adopted by the physician.

SEC. 7. A patient should, if possible, avoid even the *friendly visits of a physician* who is not attending him; and when he does receive them he should never converse on the subject of his disease, as an observation may be made, without any intention of interference, which may destroy his

confidence in the course he is pursuing, and induce him to neglect the directions prescribed to him. A patient should never send for a consulting physician without the express consent of his own medical attendant. It is of great importance that physicians should act in concert; for, although their modes of treatment may be attended with equal success when employed singly, yet conjointly they are very likely to be productive of disastrous results.

SEC. 8. When a patient wishes to dismiss his physician, justice and common courtesy require that he should declare his reasons for so doing.

SEC. 9. Patients should always, when practicable, send for their physician in the morning, before his usual hour of going out; for, by being early aware of the visits he has to pay during the day, the physician is able to apportion his time in such a manner as to prevent an interference of engagements. Patients should also avoid calling on their medical adviser unnecessarily during the hours devoted to meals or sleep. They should always be in readiness to receive the visits of their physicians, as the detention of a few minutes is often of serious inconvenience to him.

SEC. 10. A patient should, after his recovery, entertain a just and enduring sense of the value of the services rendered him by his physician; for these are of such a character that no pecuniary acknowledgment can repay or cancel them.

OF THE DUTIES OF PHYSICIANS TO EACH OTHER AND TO THE PROFESSION AT LARGE.

ARTICLE I.—*Duties for the Support of Professional Character.*

SEC. 1. Every individual, on entering the profession, as he becomes thereby entitled to all its privileges and immunities, incurs an obligation to exert his best abilities to maintain its dignity and honor, to exalt its standing, and to extend the bounds of its usefulness. He should, therefore,

observe strictly such laws as are instituted for the government of its members; should avoid all contumelious and sarcastic remarks relative to the Faculty, as a body; and while, by unwearied diligence, he resorts to every honorable means of enriching the science, he should entertain a due respect for his seniors, who have, by their labors, brought it to the elevated condition in which he finds it.

SEC. 2. There is no profession, from the members of which greater purity of character and a higher standard of moral excellence are required, than the medical; and to attain such eminence, it is a duty every physician owes alike to his profession and his patients. It is due to the latter, as without it he cannot command their respect and confidence; and to both, because no scientific attainments can compensate for want of correct and moral principles. It is also incumbent upon the Faculty to be temperate in all things, for the practice of physic requires the unremitting exercise of a clear and vigorous understanding; and, on emergencies, for which no professional man should be unprepared, a steady hand, an acute eye, and an unclouded head may be essential to the well-being, and even to the life, of a fellow-creature.

SEC. 3. It is derogatory to the dignity of the profession to resort to public advertisements, or private cards, or handbills, inviting the attention of individuals affected with particular diseases, publicly offering advice and medicine to the poor gratis, or promising radical cures; or to publish cases and operations in the daily prints, or suffer such publications to be made; to invite laymen to be present at operations, to boast of cures and remedies, to adduce certificates of skill and success, or to perform any other similar acts. These are the ordinary practices of empirics, and are highly reprehensible in a regular physician.

SEC. 4. Equally derogatory to professional character is it for a physician to hold a patent for any surgical instrument or medicine; or to dispense a secret *nostrum*, whether it be

the composition or exclusive property of himself or of others. For if such nostrums be of real efficacy, any concealment regarding it is inconsistent with beneficence and professional liberality; and if mystery alone give it value and importance, such craft implies either disgraceful ignorance or fraudulent avarice. It is also reprehensible for physicians to give certificates attesting the efficacy of patent or secret medicines, or in any way to promote the use of them.

ARTICLE II —*Professional services of Physicians to each other.*

SEC. 1. All practitioners of medicine, their wives, and their children, while under the paternal care, are entitled to the gratuitous services of any one or more of the Faculty residing near them, whose assistance may be desired. A physician afflicted with disease is usually an incompetent judge of his own case; and the natural anxiety and solicitude which he experiences at the sickness of a wife, a child, or any one who, by the ties of consanguinity, is rendered peculiarly dear to him, tend to obscure his judgment and produce timidity and irresolution in his practice. Under such circumstances, medical men are peculiarly dependent upon each other, and kind offices and professional aid should always be cheerfully and gratuitously afforded. Visits ought not, however, to be obtruded officiously; as such unasked civility may give rise to embarrassment, or interfere with that choice on which confidence depends. But, if a distant member of the Faculty, whose circumstances are affluent, request attendance, and an honorarium be offered, it should not be declined; for no pecuniary obligation ought to be imposed which the party receiving it would wish not to incur.

ARTICLE III.—*Of the Duties of Physicians as Respects Vicarious Offices.*

SEC. 1. The affairs of life, the pursuit of health, and the various accidents and contingencies to which a medical man is peculiarly exposed, sometimes require him temporarily to

withdraw from his duties to his patients, and to request some of his professional brethren to officiate for him. Compliance with this request is an act of courtesy, which should always be performed with the utmost consideration for the interest and character of the family physician, and when exercised for a short period, all the pecuniary obligations for such service should be awarded to him. But if a member of the profession neglect his business in quest of pleasure and amusement, he cannot be considered as entitled to the advantages of the frequent and long continued exercise of this fraternal courtesy, without awarding to the physician who officiates the fees arising from the discharge of his professional duties.

In obstetrical and important surgical cases, which give rise to unusual fatigue, anxiety and responsibility, it is just that the fees accruing therefrom should be awarded to the physician who officiates.

ARTICLE IV.—*Of the Duties of Physicians in regard to Consultations.*

SEC. 1. A regular medical education furnishes the only presumptive evidence of professional abilities and acquirements, and ought to be the only acknowledged right of an individual to the exercise and honors of his profession. Nevertheless, as in consultations the good of the patient is the sole object in view, and this is often dependent on personal confidence, no intelligent regular practitioner who has a license to practice from some medical board of known and acknowledged respectability, recognized by this Association, and who is in good moral and professional standing in the place in which he resides, should be fastidiously excluded from fellowship, or his aid refused in consultation, when it is requested by the patient. But no one can be considered as a regular practitioner or a fit associate in consultation, whose practice is based on an exclusive dogma, to the rejection of the accumulated experience of the profession, and of the aids actually furnished by anatomy, physiology, pathology and organic chemistry.

SEC. 2. In consultations, no rivalship or jealousy should be indulged; candor, probity, and all due respect should be exercised toward the physician having charge of the case.

SEC. 3. In consultations, the attending physician should be the first to propose the necessary questions to the sick; after which the consulting physician should have the opportunity to make such further inquiries of the patient as may be necessary to satisfy him of the true character of the case. Both physicians should then retire to a private place for deliberation; and the one first in attendance should communicate the directions agreed upon to the patient or his friends, as well as any opinions which it may be thought proper to express. But no statement or discussion of it should take place before the patient or his friends, except in the presence of all the Faculty attending, and by their common consent; and no *opinions or prognostications* should be delivered, which are not the result of previous deliberation and concurrence.

SEC. 4. In consultations, the physician in attendance should deliver his opinion first; and when there are several consulting, they should deliver their opinions in the order in which they have been called in. No decision, however, should restrain the attending physician from making such variations in the mode of treatment as any subsequent unexpected change in the character of the case may demand. But such variation, and the reasons for it, ought to be carefully detailed at the next meeting in consultation. The same privilege belongs also to the consulting physician if he is sent for in an emergency, when the regular attendant is out of the way, and similar explanations must be made by him at the next consultation.

SEC. 5. The utmost punctuality should be observed in the visits of physicians when they are to hold consultation together, and this is generally practicable, for society has been considerate enough to allow the plea of a professional en-

gagement to take precedence of all others, and to be an ample reason for the relinquishment of any present occupation. But, as professional engagements may sometimes interfere and delay one of the parties, the physician who first arrives should wait for his associate a reasonable period, after which the consultation should be considered as postponed to a new appointment. If it be the attending physician who is present, he will of course see the patient and prescribe; but if it be the consulting one, he should retire, except in case of emergency, or when he has been called from a considerable distance, in which latter case he may examine the patient, and give his opinion in *writing* and *under seal*, to be delivered to his associate.

SEC. 6. In consultations, theoretical discussions should be avoided, as occasioning perplexity and loss of time. For there may be much diversity of opinion concerning speculative points, with perfect agreement in those modes of practice which are founded, not on hypothesis, but on experience and observation.

SEC. 7. All discussions in consultation should be held as secret and confidential. Neither by words nor manner should any of the parties to a consultation assert or insinuate that any part of the treatment pursued did not receive his assent. The responsibility must be equally divided between the medical attendants; they must equally share the credit of success as well as the blame of failure.

SEC. 8. Should an irreconcilable diversity of opinion occur when several physicians are called upon to consult together, the opinion of the majority should be considered as decisive, but if the numbers be equal on each side, then the decision should rest with the attending physician. It may, moreover, sometimes happen that two physicians cannot agree in their views of the nature of a case, and the treatment to be pursued. This is a circumstance much to be deplored, and should always be avoided, if possible by mutual concessions,

as far as they can be justified by a conscientious regard for the dictates of judgment. But in the event of its occurrence, a third physician should, if practicable, be called to act as umpire; and, if circumstances prevent the adoption of this course, it must be left to the patient to select the physician in whom he is most willing to confide. But, as every physician relies upon the rectitude of his judgment, he should, when left in the minority, politely and consistently retire from any further deliberation in the consultation, or participation in the management of the case.

SEC. 9. As circumstances sometimes occur to render a *special consultation* desirable, when the continued attendance of physicians might be objectionable to the patient, the member of the Faculty whose assistance is required in such cases should sedulously guard against all future unsolicited attendance. As such consultations require an extraordinary portion, both of time and attention, at least a double honorarium may be reasonably expected.

SEC. 10. A physician who is called upon to consult, should observe the most honorable and scrupulous regard for the character and standing of the practitioner in attendance; the practice of the latter, if necessary, should be justified as far as it can be, consistently with a conscientious regard for truth, and no hint or insinuation should be thrown out which could impair the confidence reposed in him, or affect his reputation. The consulting physician should also carefully refrain from any of those extraordinary attentions or assiduities, which are too often practiced by the dishonest for the base purpose of gaining applause, or ingratiating themselves into the favor of families and individuals.

ARTICLE V.—*Duties of Physicians in Cases of Interference.*

SEC. 1. Medicine is a liberal profession, and those admitted into its ranks should found their expectations of practice upon the extent of their qualifications, not on intrigue or artifice.

SEC. 2. A physician, in his intercourse with a patient under the care of another practitioner, should observe the strictest caution and reserve. No meddling inquiries should be made; no disingenuous hints given relative to the nature and treatment of his disorder; nor any course of conduct pursued that may directly or indirectly tend to diminish the trust reposed in the physician employed.

SEC. 3. The same circumspection and reserve should be observed when, from motives of business or friendship, a physician is prompted to visit an individual who is under the direction of another practitioner. Indeed, such visits should be avoided, except under peculiar circumstances; and when they are made, no particular inquiries should be instituted relative to the nature of the disease, or the remedies employed, but the topics of conversation should be as foreign to the case as circumstances will admit.

SEC. 4. A physician ought not to take charge of or prescribe for a patient who has recently been under the care of another member of the Faculty in the same illness, except in cases of sudden emergency, or in consultation with the physician previously in attendance, or when the latter has relinquished the case, or been regularly notified that his services are no longer desired. Under such circumstances, no unjust and illiberal insinuations should be thrown out in relation to the conduct or practice previously pursued, which should be justified as far as candor and regard for truth and probity will permit; for it often happens that patients become dissatisfied when they do not experience immediate relief, and, as many diseases are naturally protracted, the want of success, in the first stage of treatment, affords no evidence of a lack of professional knowledge and skill.

SEC. 5. When a physician is called to an urgent case, because the family attendant is not at hand, he ought, unless his assistance in consultation be desired, to resign the care of the patient to the latter immediately on his arrival.

SEC. 6. It often happens, in cases of sudden illness or of recent accidents and injuries, owing to the alarm and anxiety of friends, that a number of physicians are simultaneously sent for. Under these circumstances, courtesy should assign the patient to the first who arrives, who should select from those present any additional assistance that he may deem necessary. In all such cases, however, the practitioner who officiates should request the family physician, if there be one, to be called, and, unless his further attendance be requested, should resign the case to the latter on his arrival.

SEC. 7. When a physician is called to the patient of another practitioner, in consequence of the sickness or absence of the latter, he ought, on the return or recovery of the regular attendant, and with the consent of the patient, to surrender the case.

[The expression "patient of another practitioner" is understood to mean a patient who may have been under the charge of another practitioner at the time of the attack of sickness, or departure from home of the latter, or who may have called for his attendance during his absence or sickness, or in any other manner given it to be understood that he regarded the said physician as his regular medical attendant.]

SEC. 8. A physician, when visiting a sick person in the country, may be desired to see a neighboring patient who is under the regular direction of another physician, in consequence of some sudden change or aggravation of symptoms. The conduct to be pursued on such an occasion is to give advice adapted to present circumstances; to interfere no further than is absolutely necessary with the general plan of treatment; to assume no future direction, unless it be expressly desired; and, in this last case, to request an immediate consultation with the practitioner previously employed.

SEC. 9. A wealthy physician should not give advice *gratis* to the affluent; because his doing so is an injury to his pro-

fessional brethren. The office of a physician can never be supported as an exclusively beneficent one; and it is defrauding, in some degree, the common funds for its support, when fees are dispensed with, which might justly be claimed.

SEC. 10. When a physician who has been engaged to attend a case of midwifery is absent, and another is sent for, if delivery is accomplished during the attendance of the latter, he is entitled to the fee, but should resign the patient to the practitioner first engaged.

ARTICLE VI.—*Of Differences between Physicians.*

SEC. 1. Diversity of opinion and opposition of interest, may, in the medical, as in other professions, sometimes occasion controversy and even contention. Whenever such cases unfortunately occur, and cannot be immediately terminated, they should be referred to the arbitration of a sufficient number of physicians, or a *court-medical*, or, where both parties are members of the Medical Society of their county, to the Censors.

SEC. 2. As peculiar reserve must be maintained by physicians toward the public, in regard to professional matters, and as there exists numerous points in medical ethics and etiquette through which the feelings of medical men may be painfully assailed in their intercourse with each other, and which cannot be understood or apprehended by general society, neither the subject-matter of such differences, nor the adjudication of the arbitrators should be made public, as publicity in a case of this nature may be personally injurious to the individuals concerned, and can hardly fail to bring discredit on the Faculty.

ARTICLE VII.—*Of Pecuniary Acknowledgment.*

Some general rules should be adopted by the Faculty, in every town or district, relative to *pecuniary acknowledgments* from their patients; and it should be deemed a point

of honor to adhere to these rules with as much uniformity as varying circumstances will admit.

OF THE DUTIES OF THE PROFESSION TO THE PUBLIC, AND OF THE OBLIGATIONS OF THE PUBLIC TO THE PROFESSION.

ARTICLE I.—*Duties of the Profession to the Public.*

SEC. 1. As good citizens, it is the duty of physicians to be ever vigilant for the welfare of the community, and to bear their part in sustaining its institutions and burdens; they should also be ever ready to give counsel to the public in relation to matters especially appertaining to their profession, as on subjects of medical police, public hygiene, and legal medicine. It is their province to enlighten the public in regard to quarantine regulations — the location, arrangement and dietaries of hospitals, asylums, schools, prisons, and similar institutions — in relation to the medical police of towns, of drainage, ventilation, etc. — and in regard to measures for the prevention of epidemic and contagious diseases; and when pestilence prevails, it is their duty to face the danger, and to continue their labors for the alleviation of the suffering, even at the jeopardy of their own lives.

SEC. 2. Medical men should also be always ready, when called on by the legally constituted authorities, to enlighten coroners' inquests and courts of justice on subjects strictly medical; such as involve questions relating to sanity, legitimacy, murder by poisons or other violent means, and in regard to the various other subjects embraced in the science of Medical Jurisprudence. But in these cases, and especially where they are required to make a *post mortem* examination, it is just, in consequence of the time, labor, and skill required, and the responsibility and risk they incur, that the public should award them a proper honorarium.

SEC. 3. There is no profession, by the members of which eleemosynary services are more liberally dispensed than the medical, but justice requires that some limits should be placed to the performance of such good offices. Poverty, professional brotherhood, and certain of the public duties referred to in the first section of this article, should always be recognized as presenting valid claims for gratuitous services; but neither institutions endowed by the public or by rich individuals, societies for mutual benefit, for the insurance of lives, or for analagous purposes, nor any profession or occupation, can be admitted to possess such privilege. Nor can it be justly expected of physicians to furnish certificates of inability to serve on juries, to perform militia duty, or to testify to the state of health of persons wishing to insure their lives, obtain pensions, or the like, without pecuniary acknowledgment. But to individuals of indigent circumstances, such professional services should always be cheerfully and freely accorded.

SEC. 4. It is the duty of physicians, who are frequent witnesses of the enormities committed by quackery, and the injury of health and even destruction of life caused by the use of quack medicines, to enlighten the public on these subjects, to expose the injuries sustained by the unwary from the devices and pretensions of artful empirics and impostors. Physicians ought to use all the influence which they may possess, as Professors in Colleges of Pharmacy, and by exercising their option in regard to the shops to which their prescriptions shall be sent, to discourage druggists and apothecaries from vending quack or secret medicines, or from being in any way engaged in their manufacture and sale.

ARTICLE II.—*Obligations of the Public to Physicians.*

The benefits accruing to the public, directly and indirectly, from the active and unwearied beneficence of the profession, are so numerous and important, that physicians are justly

entitled to the utmost consideration and respect from the community. The public ought likewise to entertain a just appreciation of medical qualifications; to make a proper discrimination between true sciences and the assumptions of ignorance and empiricism; to afford every encouragement and facility for the acquisition of medical education; and no longer to allow the statute books to exhibit the anomaly of exacting knowledge from physicians, under a liability to heavy penalties, and of making them obnoxious to punishment for resorting to the only means of obtaining it.

ERRATA.

DR. REAMY'S RETIRING ADDRESS.

Page 33—*Hopital du midi* for *du midi Hopital.*

Page 35—For "protest against my daughter or my sister becoming physicians," "protest against my daughter or my sister *becoming* a *physician.*"

Near bottom page 35—"An age of skepticism and doubt of questioning," should be in caps, with space.

LIST OF MEMBERS

OF

OHIO STATE MEDICAL SOCIETY,

With Post-office Address, date of Admission, and date of Death.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Ackley, H. A.*	Cleveland	1850	
Allen, Peter*	Kinsman	1850	
Agard, Aurelius H.	Sandusky	1853	
Amos, C. E.*	Cleveland	1852	
Angel, E*	Akron	1852	
Applegate, Fred. C.	Windham	1859	
Almy, S. C	Cincinnati	1862	
Armstrong, T. H.	Pawhatan Point	1862	
Allen, D. B.	West Liberty	1865	
Anderson, W. S.	Newtonville	1867	
Aiken, P. J.	Newark	1869	
Alcorn, A. W.	Ravenna	1870	
Allen, Dudley	Oberlin	1870	
Ball, A.	Zanesville	1848	
Baker, Timothy	Wooster	1851	
Baker, A. H*	Cincinnati	1846	1865
Beach, C. H.	Wellington	1868	
Belding, Alvin	Ravenna	1853	
Beagrand, Pierce	Fremont	1853	
Bigelow, J. M.	Lancaster	1846	
Boerstler, G. W.	Lancaster	1846	
Boalse, A. N.*	Lockburn	1848	
Boyle, C. E.*	Columbus	1851	1870
Bonner, Stephen	Cincinnati	1847	
Brown, E. T.*	Logan	1849	
Bricker, W. R.	Shelby	1848	
Bronson, James	Newton Falls	1852	
Buckner, Philip J.*	Cincinnati	1850	
Butterfield, John*	Columbus	1846	1847
Bing, J. P.	Pomeroy	1851	
Brown, J. M.	Cincinnati	1851	
Brinkerhoof, D. H.	Willoughby	1853	
Buckner, Wm.*	Hamilton	1853	
Burr, J. N.	Mt. Vernon	1853	
Brooks, J. H.	Brownsville	1854	
Brennan, Thomas*	Dayton	1855	1858
Bell, A. E	Zanesville	1855	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Buckingham, E. M.	Springfield	1855	
Brown, B. S.	Belletontaine	1855	
Brellen, Joseph	Grove City	1856	
Boyd, G. M.	Xenia	1857	
Battles, W. S.	Shreve	1858	
Brook, Geo. W	Ellsworth	1858	
Bertolett, D. H	Letonia	1858	
Baker, Norman	Lucas	1858	
Bridge, W. W.*	Marion	1859	1864
Brayton, A	Cary	1859	
Beach, J. N.	West Jefferson	1859	
Brenton, J. L.	North Georgetown	1860	
Blizzard, S. R.	Huntsville	1860	
Blackman, G. C.*	Cincinnati	1860	1871
Beeman, P.	Iola, Kansas	1861	
Brooks, M. L	Cleveland	1861	
Bowers, E. D.	Columbus	1861	
Beverly, P. F.	Jerome	1862	
Beach, A. J.	Belleville	1863	
Brown, J. C	Urbana	1863	
Buckner, J. H.	Cincinnati	1863	
Bunce, Wm.	Oberlin	1964	
Ballinger, Wm. J.	Pleasant Valley	1864	
Brown, Wm. A.	McConnellsville	1865	
Baggs, James	Ontario	1866	
Black, J. R.	Newark	1867	
Besse, H.	Delaware	1868	
Berlin, C.	Wapakonetta	1868	
Blymer, A.	Delaware	1868	
Blesch, P. E	Columbus	1869	
Bartholow, Robert	Cincinnati	1869	
Bennet, John	Cleveland	1869	
Beardsley, C. E.	Ottawa	1869	
Bertolett, W. J.	Shreve	1869	
Brown, J. A.	Degraff	1869	
Bracken, W. C.	Jersey	1869	
Butler, G. W.	Alton	1869	
Brainard, A. C.	Olmstead Falls	1870	
Bruce, A. G.			
Bramble, D. D.	Cincinnati	1870	
Boerstler, G. W. Jr.	Lancaster	1870	
Bertolett, J. B.	Letonia	1870	
Bertolett, H. A.	Washingtonville	1870	
Butler, Geo. O.	Cleveland	1870	
Ballard, H. D.	Findlay	1870	
Brainard, H. C.	Cleveland	1870	
Bennet, P. C.	Freedom	1870	
Bishop, S. P.	Delta	1870	
Bigney, P. M	Cincinnati	1871	
Bishop, L. W	Maineville	1871	
Bryant W. G	Springfield	1871	
Cary, Abel	Salem	1852	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Creeme, P. M.	Eaton	1847	
Conkiin, H. S.	Sidney	1849	
Cook, F.*	Atwater	1853	1857
Cary, Abel	Salem	1852	
Chamberlin, E. K.*	Cincinnati	1847	1847
Cotton, J. D	Marietta	1852	
Conner, P. S.*	Cincinnati	1853	
Coons, Israel A	Middletown	1853	
Cox, D. A.*	New Paris	1846	
Crook, James M.*	Dayton	1853	
Carroll, Thomas*	Cincinnati	1854	1871
Culbertson, Howard	Zanesville	1855	
Campbell, John	Uniontown	1855	
Caldwell, Joseph*	Huron	1857	1866
Cushing, H. K.	Cleveland	1857	
Caruthers, John A	Kilbourne	1859	
Cadwallader, Rowland	Findlay	1862	
Cook, Charles C.*	Youngstown	1862	1863
Clark, Henry P	Ashland	1862	
Cutler, James	Bellepoint	1864	
Combs, J. S	Owensville	1865	
Clason, Thos. S	Bellefontaine	1865	
Carter, J. O	Marion	1866	
Corson, John	Middletown, Butler Co.	1866	
Constant, W. S.	Delaware	1866	
Coleman, Horace	Troy	1867	
Chessney, W. M.	Kenton	1867	
Courtwright, G. S	Lithopolis	1867	
Conner, P. S.	Cincinnati	1868	
Conklin, W. J	Dayton	1868	
Clark, John H	Mechanicsburg	1869	
Chase, B. S	Akron	1870	
Cassat, M.	Cincinnati	1870	
Cutler, E. J	Cleveland	1870	
Carson, Wm	Cincinnati	1871	
Cottle, L. A	Maineville	1871	
Campbell, W. H	Concord, Ky	1871	
Carmichael, W. A.	Loveland	1871	
Courtright, A. P	Groveport	1871	
Danna, M.*		1849	
Delemater, John*	Cleveland	1850	1867
Dorsey, G. V	Piqua	1850	
Denig, R. M.	Columbus	1851	
Dolman, Wm.*	Cleveland	1852	
Dawson, W. W	Cincinnati	1853	
Davis, John	Dayton	1853	
Dawson, John*	Columbus	1851	1866
Davis, John	Cincinnati	1854	
Donohoe, H. J.	Sandusky	1854	
Dunlap, Alexander	Springfield	1854	
Dodge, J. S.	Cincinnati	1854	
Dean, W. F.*	Milan	1857	In army.

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Darwin, Henry W	Gettysburg	1859	
Drake, J. L	Lebanon	1859	
Drury, Wm. H	Columbus	1859	
Dalton, N	Logan	1860	
Davis, Wm. B	Cincinnati	1865	
Dillon, Horace D	Warren	1866	
Dunlap, A. S	Springfield	1868	
Daugherty, G. A	Cincinnati	1868	
Dunlap, C. W	Springfield	1869	
Dalby, Isaac N	Cleveland	1870	
Day, E. A		1871	
Dandridge, N. P.	Cincinnati	1871	
Ells, G. E.*	Lithopolis	1849	1867
Estep, William	Lloydsville	1852	
Edwards, J. D	Xenia	1867	
Ellis, A. N	Lockland	1868	
Eckman, Hiram	Tuscarawas	1869	
Everhard, N. S	Wadsworth	1870	
Ebright, L. S	Middlebury	1870	
Foulke, L. W	Chillicothe	1850	
Fyffe, E. P.*	Urbana	1851	1867
Firestone, L	Wooster	1852	
Fuller, S. W	West Liberty	1853	
Foote, H. E.*	Cincinnati	1854	1871
Falconer, Cyrus	Hamilton	1854	
Foster, Nathaniel	Cincinnati	1854	
Farrington, S. H	Ashtabula	1856	
Finch, S. F	Green Springs	1857	
Fries, George*	Cleveland	1862	1866
Follet, Alfred	Granville		
Fuller, A. B	Loudonville	1868	
French, C. M	Portsmouth	1869	
Firestone, J. L	Salem	1870	
Gay, N	Columbus	1848	
Gard, B. F.*	Columbus	1847	1849
Gillett, Bartley	Springfield	1849	
Gaston, E.*	Morristown	1849	1868
Gordon, T. W	Georgetown	1849	
Goble, P	Worthington	1849	
Gailey, J. D.*	Marion	1851	
Gille, L. C. C.*	Westville	1853	
Gerwe, F. A. J	Cincinnati	1854	
Gabriel, R. W.*	Dublin	1854	1860
Gotwald, A. G	Dayton	1854	
Green, M.*	Cambridge	1855	1856
Gilcrist, R. S	Degraff	1856	
Gabriel, J. F	Piqua	1856	
Gundry, Richard	Dayton	1856	
Guerin, Z. F	Westerville	1856	
Galpin, Loman	Milan	1857	
Gans, S.*	Cincinnati	1861	1864
Gonsaulis, C	Sparta	1863	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Griswold, Wayne	Circleville	1866	
Gray, S. S	Piqua	1867	
Goldrick, Wm	Delaware	1868	
Guyttard, F	New Bedford	1870	
Gawne, A. J	Sandusky	1870	
Guthrie, James W	Wooster	1870	
Gould, D. T	Cleveland	1870	
Gibson, R. McD	Seneca County	1871	
Green, J. H.	Troy, O	1871	
Hills, R		1846	
Howard, R. L.*	Columbus	1846	
Helmick, J	Harrisburg	1849	
Hornbeck, L.*	New Carlisle	1849	
Hurxthall, F. T.*	Massillon	1849	1865
Huestis, Isaac	Chesterhill	1849	
Harley, L. G	Dalton	1853	
Henderson, J. P	Newville	1850	
Hamilton, J. W	Columbus	1849	
Howard, E. W	Akron	1852	
Hopkins, Rudd C.*	Newburg	1852	In army.
Hildreth, C. C	Zanesville	1853	
Helmick, G. W.*	Harrisburg	1848	
Hoagland, C. N	Troy	1853	
Holston, J. G. F	Zanesville	1850	
Haines, Job*	Dayton	1853	1860
Hart, B. F	Marietta	1854	
Haines, V.*	Cambridge	1853	1865
Henderson, D. W	Waynesville	1856	
Hubbard, J. C	Ashtabula	1856	
Harmon, Julian	Warren	1857	
Hitchcock, Jas	Port Clinton	1857	
Hughes, J. W.*	Berlin Center	1858	1869
Hall, W. E.	Fayetteville	1859	
Houston, J. T	Jamestown	1859	
Hill, E. L.	Oxford	1857	
Hagett, J. P.*	Eaton	1861	1862
Hays, Wm.	Melfordton	1862	
Hyatt, E. H.	Delaware	1862	
Hamil, J. J	Newark	1863	
Henderson, R. A	Upper Sandusky	1865	
Herrick, H. J	Cleveland	1865	
Hadley, Edwin	Richmond	1865	
Hill, N. S.	Newville	1866	
Hunt, Chas	Wooster	1866	
Hopkins, D. O	St. Paris.	1866	
Hazzard, J. S. R	Springfield	1867	
Hill, H	West Alexandria	1867	
Hendrickson, Hugh	Lewis Center	1868	
Hunt, A. H	Blackleyville	1868	
Harrison, Eugene	Napoleon.	1869	
Higgins, C. W	Big Plain	1869	
Halderman, D	Columbus	1869	

* Deceased

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Hough, J. B.	Ridgeville	1869	
Heuston R. C.	Oxford	1868	
Heighway, A. E.	Cincinnati	1870	
Hurd, A.	Findlay	1870	
Houghton, J. W.	Wellington	1870	
Hobson, J. F.		1870	
Hadlock, J. W.	Cincinnati	1871	
Herrick, L. C.	Cleveland	1871	
Hall, N.	Cincinnati	1871	
Hyde, William.	Fulton County	1871	
Hall, J. M.	Fayetteville	1871	
Holdt, George.	Cincinnati	1871	
Huggins, R. D.	West Alexandria	1871	
Judkins, J. P.*	Cincinnati	1846	1867
Johnson, Wm.*	Delaware	1850	
Judkins, Wm.*	Cincinnati	1847	1861
Jones, T. W.	South Bloomfield	1847	
Junkens, M. W.	Bellair	1859	
Joseph, A. P.	Fairmount	1862	
Jones, R. E.	Gomer	1863	
Johnson, R. A.	Wellsville	1864	
Jacobs, W. C.	Akron	1866	
Jenner, A. E.	Crestline	1866	
Jennings, E.	Dayton	1867	
Jones, A. B.	Portsmouth	1868	
Jones, W. H.	Cleveland	1868	
Jones, L. M.	West Liberty	1869	
Jewett, W. H.	Hilliard	1869	
Jennings, J. D.	Sonora	1869	
Jobes, J. A.	Palestine	1870	
Jewett, M.	Middleburg	1870	
Jones, J. D.	Newburg	1870	
Jones, D. J.		1870	
Jones, N. M.	Cleveland	1870	
Jewett, H. S.	Dayton	1871	
Kirtland, J. P.	Cleveland	1846	
Kable, W. R.*	Bellebrook	1846	1859
Kreider, M. Z.*	Lancaster	1846	
Keever, M. H.	Ridgeville	1850	
Kay, Isaac.	Springfield	1853	
Kincaid, W. P.	New Richmond	1854	
Kennedy, J. C.	Batavia	1854	
Kyle, J. G.*	Xenia	1856	1870
Kennedy, J. L.*	Batavia	1864	1866
Kinsman, D. W.	Circleville	1864	
Kelley, H. R.	Galion	1868	
Kemps, J. D.	Vandalia	1868	
Knowlton, A. P.	Olmstead Falls	1870	
Kinnaman, J. W.	Ashland	1870	
Kirby, Jacob.	Hillsboro	1871	
Landon, G. W. H.			
Lewis, D.			

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Landon, C. P	Westerville		
Langworthy, O. B			
Lyman, C. N			
Lamme, W. H			
Lane, E. S			
Lathrop, H.*	Columbus	1846	1849
Lawson, L. M.*	Cincinnati	1853	1864
Leonard, B. B	West Liberty	1854	
Loving, S	Columbus	1858	
Longfellow, A. J	Fostoria	1861	
Loller, W. B	Nashville	1864	
Leonhard, C. S	Ravenna	1865	
Longworth, W. N	Van Wert	1866	
Little, J. A	Delaware	1868	
Lord, J. M	Chesterville	1868	
Lewis, W. C	Rushville	1869	
Lee, E. B	Garrettsville	1870	
Lewis, Edward C	Canal Dover	1870	
Luddington, H	Cincinnati	1871	
Larimore, F. C	Mount Vernon	1871	
Lang, E. R	Portsmouth	1871	
Ludlow, J	Cincinnati	1871	
Logan, W. M	Cincinnati	1871	
Maris, G. W	Columbus	1848	
Mitchell. G. F.*	Mansfield	1850	1869
Mussey, R. D.*	Cincinnati	1847	1866
Moore, W. C	Wooster	1852	
Millikin, Samuel*	Hamilton	1853	
Metz, Abram	Massillon	1852	
Moore, Jonas*	Marietta	1852	1856
Merriman, A.*	Madison	1853	1867
Mack, John	Shelby	1853	
Martin, Joshua*	Xenia	1853	1857
Mosgrove, J. M	Urbana	1853	
Mount, William*	Cumminsville	1853	1866
Muscroft, C. S	Cincinnati	1854	
Marshall, N. T.*	Cincinnati	1854	
Mendenhall, G	Cincinnati	1854	
Mussey, W. H	Cincinnati	1854	
Morehead, W.*	Zanesville	1855	1861
Mullen, T. J	New Richmond	1855	
Matson, A. F.*	Logansville	1857	1867
Miller, A. C	Orrville	1858	
Mahlman, C. H. W	Columbus	1859	
Mounts, J. L	Morrow	1860	
Moe, L. W	Ottawa	1860	
Maranda, Isaac	New Carlisle	1860	
Matchett, W. H	Greenville	1862	
Maynard, A	Cleveland	1863	
Mitchell, M.*	Mansfield	1863	1864
Morse, Joel	Cleveland	1863	
Moore, William	New Lisbon	1865	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Mitchell, George	Mansfield	1868	
Moore, Eugene L	Moscow	1868	
Morse, D. A	Midway	1868	
Moore, E	Warren	1868	
Miles, A. J	Cincinnati	1869	
Morris, F. B	Ross	1869	
Moore, A. C	Amelia	1869	
Mahlman, H. A	Columbus	1869	
Miller, Thomas V	Columbus	1869	
Metcalf, C. T	Warren	1870	
Miller, T. C	Cleveland	1870	
Miller, C. A	Cincinnati	1871	
Mouser, J. A	La Rue	1870	
Murray, L. S	Medina	1850	
McGuire, W. B.*	Waynesville	1848	
McLean, R. R	Lockbourne	1861	
McLaughlin, A. C	Tremont	1852	
McFarland, J. A	Tiffin	1850	
McNally, Thomas	Chillicothe	1853	
McNeal, F. D.*	Canal Dover	1854	
McIlvaine, R. R	Cincinnati	1854	1862
McMears, R. R.*	Sandusky	1854	
McDormat, C	Dayton	1857	
McBeth, J. C	Galion	1858	
McCarty, Oliver	Polk P. O	1862	
McBride, Alexander	Berea	1865	
McConnel, C. N	Upper Sandusky	1865	
McElwe, S	New Castle	1866	
McEbright, Thomas G	Akron	1866	
McKinley, C. G	Sunbury	1866	
McClure, James	Lee	1866	
McClurg, John	Center Village	1867	
McNeal, F. B	Troy	1867	
McNeely, J. S	Dalton	1867	1868
McCracken, W. A.*	Springfield	1867	
McCuskey, H	Batavia	1868	
McCallough, J. G	Bealsville	1868	
McLaughlin, R	Butler	1869	
McGraw, Aaron	Burton	1869	
McCardy, John	Youngstown	1870	
McKean, Wm	Mount Hope	1870	
McGuire, J	Norwalk	1870	
McCullom, E. J	Seneca county	1871	
Norton, J. C*	Marion	1848	
Nicholson, W. A.*	Cleveland	1853	
Noble, David	Hillsboro	1860	
Neal, T. L	Dayton	1863	
Neil, Alex	Sunbury	1868	
Noble, C. D	Oberlin	1870	
Oliver, J. Q.*	Cincinnati	1854	
Owen, H. W	Mount Vernon	1862	
Orr, G. B	Cincinnati	1871	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Owsley, J. B	Jacksonburg	1871	
Price, Jos	Randolph	1852	
Purple, J. G.*	Brooklyn	1853	
Peck, W. L	Columbus	1853	
Potter, J. F.*	Cincinnati	1854	1868
Preston, J. C	Brunswick	1857	
Pomerine, Joel	Millersburg	1858	
Pearce, Enoch, Jr	Steubenville	1859	
Patterson, A. V	Mansfield	1861	
Potter, Amos	New Madison	1863	
Pease, L. T	Williamsburg	1863	
Pullen, G. W	Logan	1864	
Paige, W. F	Johnstown	1864	
Phillips, H. W	Kenton	1866	
Pearce, H. C	Urbana	1867	
Pomeroy, O	Chardon	1869	
Pratt, E. B	Mount Sterling	1869	
Pearce, L. E	Cable	1869	
Pomerene, P. P	Berlin	1870	
Perrin, J	Cleveland	1870	
Pixley, Sumner	Peninsula	1870	
Palmer, C. D	Cincinnati	1871	
Russell, J. W	Mt. Vernon	1848	
Risinger, J. F.*	Galion	1849	1866
Robertson, Chas	McConnellsville	1849	
Rives, L. C.*	Cincinnati	1850	1870
Reeves, W. H	Springfield	1849	
Rogers, Robert	Springfield	1847	
Rodman, Thomas S.*	Cleveland	1852	
Robertson, James *	Perrysburg	1853	1854
Rigdon, L.*	Hamilton	1853	1865
Rives, Landon	Cincinnati	1853	
Rogers, J. G	New Richmond	1853	
Rusk, Daniel	Malta	1855	
Reamey, T. A	Zanesville	1855	
Robinson, J. D	Wooster	1856	
Robinson, J. N	Medina	1856	
Robb, Andrew	Blanchester	1859	
Rodgers, J. H	Springfield	1859	
Raymond, B	Carroll	1860	
Rathbun, C	Salem	1860	
Reeve, J. C	Dayton	1861	
Reid, J. T.*	Fairfield	1863	1864
Ralston, D. H	Granville	1864	
Reed, C. R	Middleport	1864	
Reed, Wm	Iberia	1865	
Reed, R. C. S	Glendale	1867	
Richie, J. H	Ontario	1867	
Rice, J. B	Fremont	1868	
Ropp, W. P	Delaware	1869	
Roots, W. Y	Milford Center	1869	
Rankin, A. H	Sandusky	1870	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Ridenour, W. T.	Toledo	1870	
Russell, J. W	Mount Vernon	1870	
Reed, A. N	Norwalk	1870	
Reed, A. B	Brooklyn Village	1870	
Randall, R.	Bath	1870	
Rosenfeld, A	Cincinnati	1871	
Skinner, J. S.†	Columbus	1849	
Steele, H. K	Dayton	1851	
Sachse, G. J.†	Columbus	1846	1860
Smith, S. M	Columbus	1846	
Smith, James	Elkhorn	1850	
Smith, Edmond†		1850	1850
Seldon, O. G	Shanesville	1851	
Silver, D. H.†	Columbus	1851	1864
Stanton, Benjamin†	Salem	1852	1861
Story, R†	Cleveland	1852	1866
Smith, A. C.†	Medina	1852	1861
Shotwell, John T.†	Cincinnati	1850	
Sanders, Moses†	Norwalk	1853	
Shaedford, R. J.†	Medway	1853	1868
Sharp, W. T.	Middleburg	1853	
Smith, J. A.†	Piqua	1853	1858
Stevens, E. B	Cincinnati	1853	
Spillman, Henry†	Medina	1855	1862
Scarf, W. D	Bellefontaine	1855	
Scott, W. J	Cleveland	1855	
Sheppard, W. A	New Vienna	1856	
Sinnett, E	Granville	1856	
Snodgrass, J. M	Ostrander	1850	
Stevenson, A. G	Richmond	1856	
Stilwell, Thomas	Fremont	1857	
Shively, J. W	Massillon	1858	
Schurtzer, J. V	Massillon	1858	
Sweney, R. L	Marion	1859	
Scoville, S. S.	Lebanon	1859	
Sharpe, E. C.†	Williamsburg	1859	1868
Southard, J. M.	Marysville	1860	
Stephenson, J. H.	Leesville	1860	
Spees, S. J	Hillsboro	1863	
Smith, J. W	Wellington	1863	
Stamp, Jacob	Mount Vernon	1866	
Sprague, James	Vienna X Roads	1866	
Scobey, W. E	Hamilton	1866	
Stansell, J. A	Forest	1866	
Sellers, A	Lebanon	1867	
Stockstill, J. W	New Carlisle	1867	
Stewart, J. W	Dayton	1868	
Shouse, B. A.	Antioch	1868	
Shields, T. P	Watkins	1868	
Seaton, A. M	Midway	1869	
Schueller, J. B	Columbus	1869	
Steeley, H. G	Sidney	1869	

† Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Smith, Harry	Mount Vernon	1869	
Steward, S. H.	Newburg	1869	
Shoemaker, J. W.	Napoleon	1869	
Silver, J. G.	St. Louis	1869	
Stanley, E.	Sandusky	1870	
Scott, A. J	Loudonville	1870	
Sykes, W. H.	Plymouth	1870	
Speece, N. V.	Quincy	1870	
Sherman, A. M.	Kent	1870	
Silver, D. R.	Applecreek	1870	
Selden, Robert	Shanesville	1870	
Smith, D. B.	Cleveland	1870	
Stark, W.	Cincinnati	1871	
Seely, W. W.	Cincinnati	1871	
Shackelton, E. L.	St. Marys	1871	
Senseman, H.	Clark county, O.	1871	
Snyder, D. J		1871	
Stanton, Byron	Cincinnati	1871	
Shepherd, W. W.	Hillsboro	1871	
Sayler, William	Gratis	1871	
Thompson, John B.	Columbus	1846	
Thompson, M.*	Mount Vernon	1850	1867
Thompson, Robert*	Columbus	1846	1865
Tilden, D. J.*	Cincinnati	1850	
Tullis, J. W.*	Troy	1851	
Tappan, Benjamin*	Steubenville	1852	
Thompson, J. C.	South Bloomfield	1848	
Tipton, R. H	Darbyville	1853	
Treon, John	Miamisburg	1853	
Taliaferro, William T.	Cincinnati	1854	
Tilden, Daniel*	Sandusky	1856	1870
Turney, S. D.	Circleville	1856	
Taggart, T. M*	Dalton	1857	1867
Thomas, K. G.*	Alliance	1858	1869
Thompson, J. W.*	Columbus	1860	1862
Thompson, A. W.	Circleville	1862	
Thompson, W. R.	Montgomery county	1871	
Turnbull, John	Xenia	1863	
Turney, Joseph	Nevada	1864	
Thorn, E.	Yellow Springs	1867	
Thuston, R. C.	Oxford	1868	
Todd, Joseph	Shreve	1868	
Tichenor, E. J	Lebanon	1869	
Terry, C. A.	Cleveland	1870	
Titus, A	Wheelersburg	1871	
Underwood, A. H.	London	1869	
Underwood, W. J.	Akron	1869	
Vattier, J. L.	Cincinnati	1850	
Van Pearse, James*	Columbus	1850	
Van Tuyl, D. R *	South Bend	1850	
Van Tuyl, H.*	Dayton	1853	
Vanatta, E.	Fultonham	1855	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Vandervort, J. W	Harveysburg	1864	
White, John*		1848	
Wilson, J. F			
Wright, M. B	Cincinnati	1852	
Woodward, Charles	Cincinnati	1851	
Woodward, Warren	Cincinnati	1871	
Williams, A. S	Fostoria	1852	
Woods, D. B	Cincinnati	1852	
Woods, John R	Warren	1871	
Wilson, Samuel	Wooster	1854	
Wilson, Albert	Sidney	1854	
Wade, D. E	Cincinnati	1854	
Williams, E	Cincinnati	1856	
Weber, G. C. E	Cleveland	1857	
Wilson, W. F	Ironton	1856	
Welsh, B. F	London	1859	
Wright, T. L	Bellefontaine	1860	
Weeks, G. R	Bloomfield	1860	
Williams, T. B	Delaware	1860	
Wallace, R.*	Lewisburg	1861	1865
Wigton, A. E.*	Delaware	1861	1862
Woods, J. T	Findlay	1862	
Woody, Robert	Eaton	1863	
Wilson, W. H	Greenfield	1865	
Weatherby, A. S	Cardington	1865	
Weaver, J. M	Wooster	1865	
Wirth, R	Columbus	1865	
Woodworth, M. C	Warren	1866	
White, J. H	Delaware	1866	
Wylie, A. N	Ripley	1866	
Woodruff, L	Alton	1867	
Willis, P. A	Bellepoint	1868	
Waterman, H. C	Middleport	1868	
Williams, D. S	West Independence	1868	
Willis, T. A	Bellepoint	1868	
Williams, A. D	Cincinnati	1868	
Wheaton, J. M	Columbus	1869	
Wagenhals, P. M	Lancaster	1869	
Wiggins, C. W	Big Blain	1869	
Watt, William	Kenton	1870	
Whiting, L. M	Canton	1870	
Woodbridge, T	Youngstown	1870	
Weed, Frank J.	Cleveland	1870	
Waggoner, Joseph	Ravenna	1870	
Wallace, J. H	Canaan	1870	
Warren, Guy	Garrettsville	1870	
Whittaker, J. T	Cincinnati	1871	
Worthington, A. T. C	Middletown	1871	

* Deceased

HONORARY MEMBERS.

Professor H. H. Childs, Pittsfield, Massachusetts.
" Charles A. Lee.
" William Tully,* New Haven, Connecticut.
" J. Knight, New Haven, Connecticut.
G. B. Guthre, M. D., New York City.
M. J. Bailey, M. D., New York City.
R. R. McIlvaine, M. D., New York City.
Professor Willard Parker, New York.
J. H. Brower, M. D., Lawrenceburg, Indiana.
M. M. Harding, M. D., Indiana.
George Sutton, M. D., Indiana.
J. C. Blackburn, M. D., Covington, Kentucky.
J. L. Hayes, M. D., Philadelphia, Pennsylvania.
Professor R. D. Mussey, Cincinnati, Ohio.
R. E. Houghton, M. D., Richmond, Indiana.
Robert Thompson,* M. D., Columbus, Ohio.
G. W. Boestler, M. D., Lancaster, Ohio.
W. B. Lyons, M. D., Huntington, Indiana.
J. M. Stevenson, M. D., Pennsylvania.
J. M. Kitchen, M. D., Indianapolis, Indiana.
S. P. Hunt, M. D., Sterling, Illinois.

* Deceased.